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Publication in International Journals: Rhetorical Difficulties and Strategies. The Case of Sétif University Sciences Teachers.

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Dedication

I dedicate this work to my family and friends who believed in me and kept supporting me.

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Abstract

Given the importance of writing for scholarly publication in English, it is vital to examine the challenges researchers face in writing research articles and the strategies adopted in overcoming those difficulties in the Algerian context. Therefore, the present exploratory study aim is to investigate the rhetorical difficulties sciences' teachers at the University of Sétif 1encounter in writing for publication and the strategies they apply to survive in the academic community and write their research articles. A mixed method approach frames the study methodologically: a questionnaire is designed for 20 teachers from the departments of Biology, Earth Sciences, and Agricultural sciences selected using convenience sampling technique. An interview is conducted with six teachers from the three departments, and document analysis is applied to 15 research articles in their first and final versions and 29 reviewers' reports from ten different journals. The findings indicate that sciences teachers are moderately aware of the conventional structure of research articles. Nevertheless, they have problems in rhetorically structuring their different sections. Argumentative obligatory moves are absent in the methodology and discussion sections. To overcome their problems in writing research, sciences teachers at the University of Sétif seek assistance from the members of their discourse community, model published texts, or write in their instructional language to be translated to English. The thesis has important implications for policy makers, Academic institutions, and course designers in higher education.

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List of Abbreviations

NNs: Non Native Speaker

RAs: Research Articles

RA: Research Article

DC: Discourse Community

UK: United Kingdom

US: United States

NS: Native Speakers

LPP: Legitimate Peripheral Participation

ASJP: Algerian Scientific Journals Platform

CARS: Creating A Research Space

L1: The First Language

L2: The Second Language

GA: Genre Analysis

ESP: English for Specific Purposes

IMRD: Introduction, Method, Results, Discussion

M1: Move 1

M2: Move 2

M3: Move 3

M4: Move 4

M5: Move5

APA: American Psychological Association

MLA: Modern Language Association

General Introduction

It is generally agreed that publication in academic journals contributes to the scientific communication success in academia. However, languages structural and linguistic differences can hinder this process as researchers need to master the linguistic and discoursal aspects of the international language of science (Flowerdew, 1999; Tardy, 2004; Perez-Llantada, 2014). Currently, non- native speakers of English find writing for scholarly publication a considerable challenge. They have no choice but to acquire language proficiency and develop strategies to be members of the scientific community. Consequently, it is extremely important to investigate the challenges that hinder research writing and the strategies applied to surpass them.

The difficulties that emerging scholars may encounter when writing for publication purposes may be at the rhetorical organization level. In response to this, research was designed to help the international language non- native speakers in publishing and presenting their scientific research. Many researchers (Swales, 1990; Tompson, 1993; Dudley-Evans, 1994; Peacock, 2002; & Moyetta, 2016) attempted to solve the problem of structuring the research articles different sections by analyzing the rhetorical structure of one section in published articles to recommend templates that novice scholars may follow. The introduction section took the lions' share in the analysis by Swales Create A Research Space model (CARS) (1990; 2004). Swales (1990) analyzed research articles introductions in different disciplines to propose series of conventional and optional moves that was later called Create A Research Space Model (CARS). Following this tradition, Dudley-Evans (1994) worked on the discussion section. Thompson (1993) analyzed the results sections moves. Kanoksilapatham (2005) attempted to analyze all the sections of articles. On the other hand, Swales & Feak (1994) designed a textbook out of research and teaching experience to help graduate students with their academic writing following a rhetorical approach. Moreover, Deal (2009) designed a book to help non –native speakers to write their research papers for publication. He claimed that good scientists are not always good

writers including native speakers, and developing the skills to write is the only choice to join the international scientific research community.

From the editors' perspective, researchers face several challenges. Discourse level comes at the top of the list in terms of logical and clear linking of sentences (Gosden, 1992; Flowerdew, 2000). Flowerdew (2001) carried a research survey to journals' editors in applied linguistics. Editors, this time, mentioned in the interviews problems as authorial voice absence, lexico-grammatical and structural errors of non- native speakers contributors.

Posterior to the previously mentioned challenges in writing for scholarly publication, research writers or doctoral students refer to use strategies that help them in overcoming their problems. Seeking assistance from colleagues, supervisors, translators, and reviewers seem to be on the head of the list. The scientific content and the language of presenting the scientific material are the two main levels that receive revisions with the aid of manuscript shapers (Gosden 1995; Burrough-Boenisch, 2003; Hasrati, 2005; Li, 2005; & Li, 2006). Research writers can also refer to their mother tongue or technical language to write their manuscripts. In the case of using the mother tongue, the second compulsory step is translating the paper to English. Alternatively, scholars may imitate previously read articles in terms of structure. Modeling texts can take the form of imitating the text moves and steps or borrowing sentences or expressions from the same text (Li, 2005; Li& Flowerdew, 2007).

Given the rhetorical structure of research articles importance, it is worth to investigate the rhetorical difficulties in writing research articles in the Sétif context and explore the strategies adopted to overcome the problems. Actually, publication in international academic journals is a significant experience in a researcher career. Scholarly publication allows the researcher to present his most up-to-date findings, receive feedback from specialists, and consequently succeed in establishing membership in the academic discourse community. Moreover, it is a necessity for graduation requirement or professional academic promotion

English as an international language of all sciences seems to be an advantage for its native speakers that are able to communicate, exchange information, write, and present their findings easily. However, English non-native speakers are struggling to write and conventionally structure their research articles. Sciences teachers at the Sciences' Faculty at Sétif University strive to write their articles. They spend long times writing, waiting for reviewers' reports, and

carrying the many different modifications recommended by the journals to publish one article. Submitting research papers in acknowledged journals with high impact factors seem to be a challenge if not a dream for the majority of them. Simultaneously, little if any training is received about research writing or academic writing during their university career. Teachers find themselves under the obligation of publishing without receiving any king of training or guidance. Ergo, they seek help from language specialists who may deviate the work scientific value as they have no knowledge of the scientific fields, or they find themselves borrowing from others' works which can put them under the risk of plagiarism. Consequently, it is of utmost significance to investigate those researchers 'writing for scholarly publication difficulties as under researched area and population in literature. Moreover, strategies applied by those teachers like modeling texts or seeking help from colleagues are of a paramount importance. The study suggests solutions to those problems and recommends some measures to improve the situation.

The intent in this study is three-fold. The first aim is investigating the rhetorical organization difficulties sciences teachers at Sétif Univesity1 are confronted with when writing for scholarly publication. The difficulty is tested at the level of their awareness of research writing international conventions and the compatibility of their manuscripts with such conventions. In addition, the study aims at exploring the rhetorical difficulties of Sétif sciences teachers from the reviewers' perspective. Finally, it discovers the survival keys or strategies that enable sciences teachers to be members of the scientific community through exploring the process of writing and their scientific articles revising.

The awareness of the research articles conventional structure facilitates the mission of writing for novice scholars and other members of the academic community and saves their time. It is crucial then to test Sétif sciences teachers' awareness of the research articles rhetorical structure especially if they aim at publishing their articles in highly acknowledged journals. The present study tests their awareness through questioning the participants, yet their manuscripts' analysis provides an authentic picture of the situation and revealed the structural deficiencies in their papers. On the other hand, the publication is a whole procedure that involves many partners like editors and reviewers. It is worth to analyse the problem from different perspectives to complete the picture. The rhetorical organization difficulties are identified in the manuscripts along with the reviewers' reports for the sake of studying the situation from different angles. The analysis from the reviewers' perspective prepared research writers for the possibility of getting

their papers rejected because of linguistic and structural problem despite its significance (Ventola &Mauranen, 1996)

Moreover, when struggling in writing their research papers, sciences teachers adopt a variety of strategies that proved to be effective in some situation. Exploring those strategies during the process of writing and revising may alleviate the challenges novice researchers may face when seeking membership in the academic community. Furthermore, it keeps them informed about the obstacles they may encounter in writing for scholarly publication and equips them with the necessary strategies to face them. The goal was seeking the strategies that are applied in rhetorically organising the research articles with an ambition to discover any other new strategies that do not exist in literature due to the cultural, historical, and geographical differences between the population in our study and the populations that were subject to research in other research studies.

To achieve the goals of our study, we seek to answer the following three research questions:

Q1. What are the rhetorical difficulties that Sétif University Sciences' teachers face when writing research for publication?

Q2. What strategies do Sétif University Sciences' teachers use when writing for scholarly publication?

Q3. What changes at the rhetorical level do reviewers' reports bring to submitted research articles?

The three research questions have led to three hypotheses:

1. In addition to scientific values, awareness and application of research articles' generic conventions are indispensable in the writing for publication process.

2. Adopting strategies during the process of writing may alleviate the challenges novice researchers presumably face when seeking membership in the academic community

3. Following research writing international conventions may reduce reviewers' remarks about research articles 'structure.

Henceforth, this study significance can be in terms of two major points. First, it highlights the importance of the international discoursal conventions awareness in research writing for publication. Kaplan (1997) have shown that language can be a barrier for persons participating in science but a small number of nations (e.g. Japan, Saudi Arabia, Israel, Taiwan and Malaysia) have undertaken national strategies to solve the problem. Therefore, this research is an attempt to clarify the discoursal aspect importance in science communication and how it can hamper the Algerian sciences researchers' efficiency.

Second, the present study describes the use of English in international publication in non-native speaking countries, and in Algeria as a case in point. The language of education in Algeria is affected by many factors, historical, religious, and political ones. Consequently, sciences teachers mostly write or speak in standard Arabic that hardly appears on the international scene, or French that lost its reliability as an international language of science and communication. They lack the appropriate skills to write their research articles in the English language .In fact, they engage in translation activities to finish up their works. However, in most cases discoursal and cultural differences distort the scientific value of the findings. Therefore, this work is an answer to the need of doing more research about language difficulties sciences teachers' face to be visible in the international activities of research and cope with international scientific conventions. It is a trial to cover the Algerian problem of low participation in international events due to the rhetorical organization factor and open the doors for novice scholars to be key players in the scientific community.

At the methodological framework level, the study is exploratory in nature following a mixed method approach; it has gone through two phases. The first phase was through conducting a questionnaire with 20 sciences' teachers from the Departments of Biology, Earth Sciences, and Agricultural Sciences in the Faculty of Sciences at the University of Sétif 1 for the aim of collecting information about the participants in the following phase. The questionnaire also served in testing the participants' awareness about the organizational structure of each section in a research article. In the second phase, the focus was narrower; six participants from the three departments were selected to be interviewed. The goal behind the interview is collecting information about strategies they use in order to write and revise their manuscripts and the difficulties they face during writing. The participants then supported us with their first drafts, reviewers' reports and final published papers. Nine other articles were collected to reinforce the

results obtained. The first and the last versions of the articles were subject to moves analysis following templates obtained from literature aiming at detecting rhetorical deficiencies in those papers. Finally, for the purpose of testing the results obtained from moves analysis of the articles, the reviewers' reports were put under analysis. The analysis results were compared with the document analysis results and the questionnaire and interview results to end up with a clear vision about the rhetorical difficulties those teachers encounter during writing for scholarly publication.

The present work is divided into six chapters; it starts with an introduction that provides a preamble to the whole work by considering different areas: background of the research, purpose of the research, the research problem, the research questions, overview of methodology, and significance of the study. The review of literature is divided into two chapters each of which presents the study key components. The first chapter is entitled English language in academia; it mainly focuses on the situation of academia under the English dominance as science international language. It sheds light on the effect of that dominance on the international shares of non-native countries in the market of research taking Algeria as an example; then it moves to detail the linguistic and structural difficulties non-native researchers face when writing research in English. The chapter moves to present the different strategies applied to surpass those difficulties, and it ends up with exhibiting the editorial and publication procedure of research articles in journals. The second chapter is entitled discourse analysis and research article genre. In this chapter, approaches to discourse analysis are displayed, the genre of the research article is defined, and the different sections of a research article are structurally detailed.

The third, the fourth, and the fifth chapters are practical in nature. The third one is dedicated to describing the research paradigm, data collection tools, data analysis procedure with providing a rational for each procedure. The fourth and the fifth chapters are devoted to the results of the data analysis. The fourth chapter is centralised on the results of analysing the questionnaire and the interview; however, the fifth chapter deals with the results obtained from analysing the research articles and the reviewers' reports. Actually, both chapters are led by the research questions and hypotheses and aim at providing answers to them. The work ends with a concluding section that seeks to recommend some pedagogical solutions to the problematic situation. The suggestions are addressed to policy makers, course designers, and novice researchers. Finally, a synthesising conclusion about the different procedures gone through

during conducting the research is provided. It is worth mentioning that the whole work is written following the APA style, sixth edition (2010).

Chapter one

Chapter One: English Language in Academia

Chapter One

English Language in Academia

1.1 Introduction

A long time back, researchers were not under nowadays' pressure to publish in English, but globalization of the academy has changed the circumstances. Nowadays, researchers are urged to publish their works in international journals. Thus, they are forced to write in English and respect the international conventions. The previous section in this work presented the background of this research, the purpose of the research, the research problem, the research questions, the overview of methodology, and significance of the study.

The present chapter mirrors the actual role of English as an international language of publication. It introduces the concepts of discourse community and legitimate peripheral participation. Moreover, the chapter deals with the effects of English dominance on non -native speakers (NNs) researchers. Algeria, as a case in point, is described providing details about the Higher Education Ministry policy for research publication. Then more clarification about writing for research publication purposes, discoursal challenges encountered when writing for publication in English namely language problems, structure of research articles, and problems of style is provided. At the end, the chapter supplies a description of strategies applied by NNs of English in writing their research articles, the editorial, and the publication procedures.

1.2 English as the International Language of Publication

After the American victory in World War Two, English dominated the scene at the expense of other international languages such as French and German(Ammon, 2006). The United States' economic, political and technical power urged the spread of English as a foreign language in colonies of non English- speaking countries (Melcher & Shaw, 2003), and the dominance was extended to the international academic community.

English has become the dominant international language of publication in many European countries which switched from publishing in their original languages to English (Swales, 2004). As a case in point, Spain that have witnessed a decline in publication in Spanish language journals from 5,309 articles in 1996 to 2,744 in 2006. On the other hand, publications in English have increased from 19,820 papers in 1996 to 39,115 in 2006(Pérez- Llantada, Gibson, & Plo, 2011). In the University of Copenhagen, for instance, the number of articles published in English in natural sciences(84%) and health science (83%) extremely differs from the number of articles published in Danish (14%, 16%)(swales, 2004).

Globally, the majority (95%) of natural science journals and ninety percent (90%) of social science journals are nowadays published in all or some English within the Institute for Scientific Information (ISI). The writers of articles vary between native and NNs of English (Lillis and Curry, 2010; Hyland, 2006). Another Fact that forced the presence of English in academia is Citation Indexes that prioritize English written journals(e.g. Science Citation Index, Social Science Citation Index, and Arts and Humanities Citation Index)(Ammon, 2006).

The movement toward writing research for publication in English was the result of many factors. Firstly, the high number of scholars and post graduate students wishing to publish their research findings for doctoral graduation requirement, promotion, or being read and cited by peers in academia. Secondly, the dominance of English as a means of exchanging knowledge not just in terms of research articles and books but even in international scientific events as conferences in addition to students travelling to finish their high studies in foreign countries under the title of international research exchange(Flowerdrew,2013; Mauranen, -Llantada& Swales, 2010;Wood, 2001)

1.3 Constructivism and Research Writing

Constructivism is a theory about learning as a meaning making process. The learner in this theory learns new meaning by getting engaged in situations or contexts and builds his own knowledge (Mogashoa, 2014). Hein (2007, p.1) mentioned that learners construct their knowledge by interacting with society; they relate between what they already know and the new meaning they meet without imitation or repetition.

Social constructivism, as a type of constructivism, considers knowledge as based on the understanding of society in which culture and context are significant variables (Kim, 2006). Jackson (2006) explained that social constructivism has specific assumptions about reality like defining knowledge as a human product that is socially and culturally constructed. This theory was adopted in different disciplines among them research writing. In the latter, social constructivism has its own view of the procedure of learning how to write for scholarly publication. It is believed that the researcher should be consistent with the research community he belongs to. This consistency is at the theoretical, instrumental, and methodological levels as the ultimate aim is to persuade this community in which he has limited functions (Bazerman, 1983). This idea of belonging to a community and commitment to it has been embodied in swales notion of discourse community (Swales, 1990) that will be introduced in the next section.

1.3.1 Discourse community

According to Swales (1990) the term was appropriated by relativists and social constructivists in writing research. Swales defined discourse community (DC) as "a group of people who link up in order to pursue objectives that are prior to those of socialization and solidarity, even if these latter should consequently occur." (p.24). He proposed six characteristics to identify a discourse community namely:

- **Common public goals:** the group of people forming the community should share the same objective or goal that can be written like in the case of clubs and associations or tacit.
- **Mechanisms of intercommunication among its members:** the members of the community should have a form of communication between them. The mechanisms differ

according to the community: meetings, correspondences, emails, conversations, or newsletters.

- **Mechanisms of participation to provide information and feedback:** membership in the discourse community is guaranteed by communication exchange. To say it otherwise, the mechanisms of intercommunication should function by providing information and feedback.

- **Genres utilized in the communicative furtherance of the discourse community aims:** the discourse community possesses discoursal elements or texts to accomplish its aims.
- **Specific lexis:** it refers to the specific or technical jargon of the discourse community members to achieve its aims.
- **Members with high level of content and discoursal expertise:** for an efficient communication exchange, there should be well established members of the discourse community communicating on topics relevant to the community goals, using lexical items.

He drew difference between a speech community in which members share linguistic rules and DC in which members are specific interest group. For Hyland (2009) the term refers to the rhetorical space in which all readers, writers, and texts are brought together "foregrounding the conceptual frames that individuals use to organize their experience and get things done using language"(p. 47) .Therefore, it is the frames of communication without which no member can interpret the other member's discourse. To say it differently, membership in the community of writers for research publication as the case in the present research is directly related to the ability to meet the criteria of the community (Uzuner, 2008), and it is governed by its discoursal conventions.

1.3.2 Legitimate peripheral participation.

The notion of legitimate peripheral participation (LPP) is considered to be an aspect of constructivism view of learning. It was expanded by Lave and Wenger (1991) who tried to account for learning from the social perspective. They claimed that legitimate membership in a disciplinary community is related to participation in the community activities to move to the

mastery of experts' skills. To clarify, novice scholars need to learn different activities carried in the community they belong to, which in turn gives them credit to be experts of that community and be able to practice focal activities. LPP is explained as the name suggests. It is described as legitimate because any one can be a member of the DC; peripheral stands for marginal because participants are on the margin, and finally participation that means that knowledge is a process and not a product in which learning goes through participation in the DC activities. In the main, learning is a continuous procedure in which the scholar bases his learning on what have been done before and pave the way for what is coming next (Flowerdew, 2000).

In one of his articles, Li (2005) tried to draw the relation between the concepts of LPP and the multidimensional nature of learning non NNs novice scholars go through. He explains that his Chinese doctoral students are exposed to different kinds of meaning understanding through negotiating meaning with peers, supervisors, experts, and other members of the DC to build their status as members by publishing RAs. Contrary to that, NNs scholars are depraved of this participation in the community of their practice for many reasons: undeveloped countries do not guarantee the same work conditions and sources of data as the developed ones, students who leave their prestigious developed universities to their underdeveloped home countries may be subject *exile from paradise* syndrome (cited in Swales, 1990, p. 207). Consequently, NNs scholars will keep being at the margin of their communities of practice.

1.3.3 Dialogism.

Dialogism is considered to have relation to communicative constructivism. According to Bakhtin (1986) an utterance is a point of view that cannot stand in isolation or comes out of nothing, but utterances are related to each other as a net. Each utterance is a response to a previous one and leading to another utterance that results into a chain of speech communication between a speaker and a listener.

> But the utterance is related not only to proceeding, but also to subsequent links in the chain of speech communication... But from the very beginning, the utterance is constructed while taking into account possible responsive reactions, for whose sake, in essence, it is actually created. (Bakhtin, 1986, p. 94).

Braxley (2005) used the concept of dialogism in investigating how students master writing for publication. He suggested that researchers stand in a dialogic situation with previous literature. In other words, to write a research paper, the researcher needs to understand research that has been done before through reviewing literature, bridge the gap or add the researcher's voice, and suggests future directions for research in the future. Consequently, mastering writing research articles genre needs an understanding of researchers'' position in the whole network of research studies.

In the case of a peer- reviewed journal, dialogism is present in the writing, submitting, editing, reviewing and finally publication process. Firstly, the researcher submits the article to the journal. After editing it, the journal editor sends the article to various reviewers, who after reading the article; they present their comments on it. Then, the researcher is expected to respond to the reviewers' criticism. In some cases, the process can take more time between comments and revisions, yet in this case the researcher needs to add voices of newly published works since the beginning of the process of his work publication. Throughout this process, the researcher is in a dialogue with different parts of the publication procedure playing the role of the listener unswerving the utterances of speakers or exchange the role with them to play the role of the speaker.

Bakhtin (1981) also introduced the concept of double voice of utterances. He stated that when we produce utterances we are, in fact, responding to others utterances presenting at the same time our perceptions of them, and the same occurs with the other part to form a chain of conversation (Lee, 2004). In applying this in writing RAs, researchers should not be aware of the scientific gap only but the rhetorical structure and organization of different research articles to appropriate it in their works.

1.4 Effects of the Dominance of English on Non Native speakers Researchers

For the purpose of knowledge transfer or membership in academia, researchers all over the world are urged to disseminate their findings in international journals. Simultaneously, the challenge of writing research in English by NNs appears on the scene. Non native researchers always claim about discrimination from reviewers and editors as Flowerdew (2008) explained that proving this discrimination is not an easy job as the only evidence is the researchers' claims in publishers' forums at international conferences he attended. Writers complain of discrimination on the part of reviewers and editors based on their English. The studies (Gosden, 1992; Flowerdew, 2000; Flowerdew, 2001) focused on challenges researchers face mainly from editor's perspectives. Firstly, Gosden (1992) carried a research survey to 116 editors from North America and the United Kigdom (UK) who commented about causes of acceptance and rejection of papers in terms of language criteria. The results showed that discourse level comes at the top of the list in terms of logical and clear linking of sentences followed by "use of grammatically correct sentences", and ended with style and register and "use of a wide range of vocabulary" (Gosden, 1992, p.126).

Flowerdew (2000), on the other hand, followed the process of a participant from Hong Kong trying to publish his article. At the beginning, the article was rejected; consequently, the participant was advised to submit his article to another journal which recommended revisions in terms of clarity. The revisions were made with the help of an editor, but they were not enough. Therefore, the journal offered the help, but, surprisingly, the modifications were dramatic. What made the participant feel bad were the comments of some editors that the paper is definitely not written by a native speaker. Flowerdew (2000) carried a research survey to editors of journals in applied linguistics, who at this time, mentioned problems as absence of authorial voice, lexico-grammatical and structural errors of NNs contributors.

Secondly, challenges from writers perspective. In fact, writing for research and publication purposes is different from other kinds of writing as articles have a special rhetorical structure that should be followed to get them accepted for publication by reviewers, yet the problem lies in textbooks or guides that are designed to native speakers neglecting linguistic and cultural background of NNs. Flowerdew (1999) suggested conducting research at the micro-level taking into account the cultural and linguistic background to encourage NNs' international publication. Non native researchers claim that among the main disadvantages they have in comparison to native speakers is time needed to produce RAs due to difficulties in writing.

Hanauer and Englander (2011) have even sought to quantify this as they carried a survey to 141 Mexican, Spanish-speaking scientist from different scientific disciplines in order to measure the burdens in terms of difficulty, anxiety, and dissatisfaction. The results of the study showed that writing in English is far different from writing in Spanish. The difficulty was rated as 24%, anxiety 21% and dissatisfaction 11% more than writing papers in Spanish. Other studies' results (Flowerdew, 1999; Tardy, 2004; Perez-Llantada, 2014) agreed that language problems are on the top of challenges' list when it comes to write RAs for publication.

Flowerdew (1999) tried in his article to review the main areas of difficulty in writing for publication as follows:

> Grammar
>
> Use of citation
> Making reference to the published literature
> Structure of argument
> Textual organization
> Relating text to audience
> Ways in which to make knowledge claims
> Ways in which to reveal or conceal point of view of an author
> Use of hedges to indicate caution expected by the academic community
> Interference of different cultural views regarding the nature of academic process. (p. 127)

Interestingly enough, the list of difficulties by Flowerdew (1999) showed that scholars have linguistic and structural problems in writing RAs as the first top problems.

In this study, the Algerian researchers, as all non native scholars over the world, have difficulties in terms of structure and language of RAs; they get their submission accepted with requested revisions. Consequently, they spend time working on such revisions recommended by reviewers and editors based on language quality and their research papers rhetorical structure. It is worth mentioning the high number of those who get their RAs rejected which led to the low rate of Algerian participation in the world of science as it is shown in the next section.

1.5 Algeria in the Scientific Publication World

The previous section illustrated few among many challenges NNs face when producing and disseminating their scientific knowledge. In realty, challenges are not just related to discourse, but they may be non-discoursal when it comes to funding, expenditures, and political strategies of the country. Algeria has always given priority to the French language as it is used in education, public institutions, and media. This appears clearly in the poor scientific output of Algerian scholars. The present section illustrates the shares of Algeria in the international publication research market in comparison to world leaders and neighboring countries.

First, we start by presenting how Algerian shares have evolved in ten years (2007-2017) by giving statistics of articles number cited in Scopus, the largest abstract and citation database of peer-reviewed literature including scientific journals, books and conference proceedings. The statistics are drawn from *SCImago Journal & Country Rank* to follow the movement of Algerian researchers towards publication in English. From 2007, Algeria has witnessed a remarkable evolution in the publication rates in Scopus database as the graph indicates. The number of articles published in 2007 was 2048 RAs to be 3205 RAs in 2010. The rates continued its development and the number changed to be 5020 RAs in 2013. The number kept evolving to be 7320 RAs in 2017(SCImago Journal & Country Rank, 2019*)*.

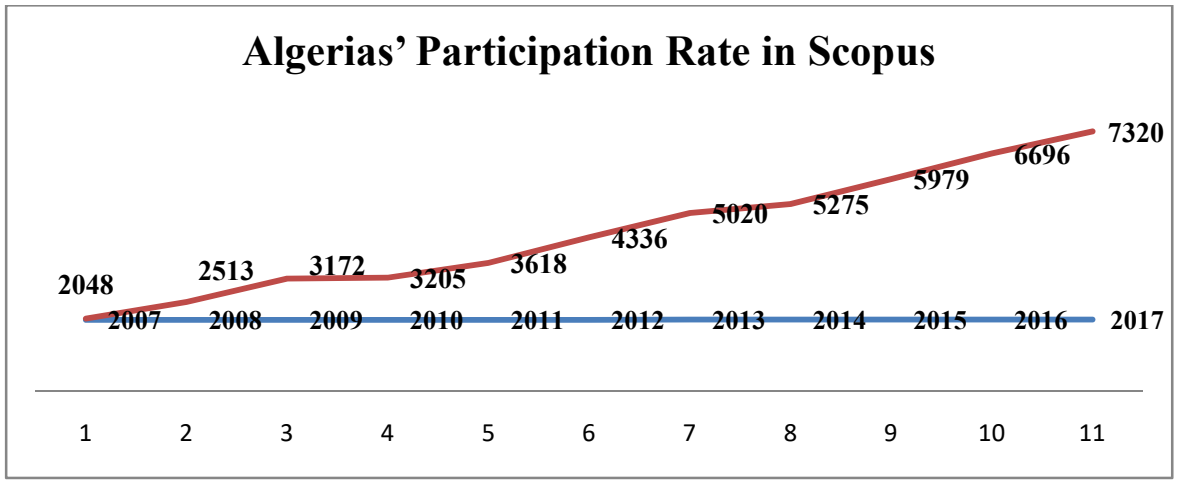


Figure 1.1 Algeria's Participation Rate in Scopus

In 2017, Algeria is ranked as the fourth country in Africa in terms of publishing articles is Scopus as ("Scimago Journal & Country Rank", 2019) indicated with 7320 RAs. However, the difference between the first country, South Africa, the second country, Tunisia, and Algeria is considerable. South Africa has published 24223RAs followed by Tunisia with 8725 RAs. Still in Africa, Morocco comes in the fifth position with 6847 RAs (SCImago Journal & Country Rank, 2019).

On the other hand, when we move to other regions, the difference becomes astonishing. In the Middle East, we find Iran in the first place with 56029 RAs and Turkey with 44548RAs. In Eastern Europe, the Russian federation occupies the first position with 89492 RAs followed by Poland with 48239 RAs. Similarly, Western Europe rates are high in comparison to Africa. The UK comes in the first place with 209593 RAs, then Germany with 180712 RAs. Moving to other continents, China is the first in Asia with 534879 RAs, and India is the second with 154619RAs. In North America, the USA is the first, and it is the first producer of RAs in the world with 683590 RAs followed by Canada with 108252 RAs (SCImago Journal & Country Rank, 2019).

Nevertheless, the comparison between those rates should take in consideration discoursal and non-discoursal variables. For the non discoursal variables, we have to consider the population in different countries. In china and USA, for instance, the population is much larger than other countries like Algeria and Tunisia, yet Poland has 38.5 million citizens, but the

publication rate is high in it. The second variable that we have to consider is the difference in disciplines; the statistics presented here refers to both social and human sciences and hard sciences. The point is that Algerians' hard sciences rates are higher in comparison to other sciences; for example, engineering produced 2414 RAs, as doctoral students and researchers in hard sciences are requested to publish in indexed journals, but the case is different for other sciences. The third variable is the government support; the USA, China and Canada provide a considerable part of the national budget to scientific research which is not the case in Algerian and other developing countries. For the discoursal variable, the native and NNs dichotomy comes to the scene; we notice that the first positions are occupied by English speaking countries (USA, UK), yet China presented the exception due to the significant importance this country gives to scientific research and teaching English as a language of science and technology.

1.6 Research publication in Algeria

The Algerian higher education and scientific research ministry has developed a specific policy concerning scientific publication in the Algerian universities. In July 7th, 2019, the ministry figured the conditions of doctoral graduation and promotion in decision 3 that follows the executive decree 8-265 of August19th, 2008 (Algerian national journal, 2019)(Appendix A). It was decided that the Algerian researchers are supposed to publish their RAs in the Algerian journals from class A, B, or C. The operation can be realised through passing by the Algerian Scientific Journals Platform (ASJP) that was founded in 2017 by the center of scientific and technical information for the purpose of organizing the publication procedure and preserving the scientific works from plagiarism, nepotism, and bureaucracy (El hamza, 2018, p .27). The platform covers 523 journals in 28 fields categorized into class A+, A, B, and C. Journals from class "C" are evaluated by a scientific committee that was founded under the decision 393 in June, 17th 2017. The categorization follows the criteria:

- The journal should be electronically available with the possibility of down loading all the articles.
- The journal should be for free(Writers are not supposed to pay fees)
- The journal should be validated by the national scientific committee for habilitation
- The journal should be publishing for at least two years and have at least four volumes(Desicion3, 2018) (Appendix B)

Actually, the platform is just concerned with Algerian journals, yet it took Scopus data base as a reference in designing the research publication criteria (Touahir& Ben chouiha, 2019). The advantage of publishing through this application is the possibility of following the manuscript track in the researcher account starting by the reception date, passing by the editor, receiving the reviewers' reports, and finally the acceptance and publication of the RA.

Similarly, researchers in scientific fields have the right to publish their works in international journals (Algerian and foreign journals) that should be indexed and peer- reviewed. The ministry introduced the list of journals that are accepted for graduation and promotion. The list covers class "A+" of journals classified in web of science with an impact factor. Class "A" is journals indexed in the web of science of Thomson Reuters with an impact factor. Then class B journals which are in the list of Thomson Reuters of all Databases, Scopus list, Journal Quality list, French National Center of Scientific Research list, Financial Times' list, Australian Business Deans Council list, and the Higher Education Research and Evaluation Agency list. Algerian researchers in scientific fields are supposed to publish their articles at least in journals from class "B" to be accepted for graduation and promotion (decision 3 that follows the executive decree 8-265 of August19th, 2008).

As a matter of fact, many challenges prevent the Algerian researchers in scientific fields from publishing in the Algerian journals and encourage them to disseminate their works in journals from other nationalities. First, the publication procedure takes too much time in comparison to international journals (Mouloudj, 2018, p. 683), and the frequency of publication along with the number of articles complicated the situation. Some journals, for instance, are published twice a year with 20 articles. Second, national journals do not have the same qualities of the international ones. In other words, researchers choose international journals that have high impact factor, high citation rates, more visibility, high acceptance rate, and indexation in acknowledged databases (Sambunjak, Huic, Hren etal, 2009; Bavedkar & Save, 2015). Those features are leading considerations in choosing journals for publication. Third, publishing in international journals increases the researcher chance to be cited and improves his university's ranking. Actually, publication citation is considered as a widely used criterion in measuring universities ranking at the national and international levels (Ale Ebrahim, Gholizadeh & Lugmayr, 2017).

1.7 Academic Writing for Research Publication Purposes

The significance of any scientific achievement that can be an idea, invention, or discovery is related or achieved through its publication that entails a whole process of submission of a research paper about the work and convincing attempts to both editors and reviewers to validate it.“No new discovery, insight, invention or understanding has any significance until it is made available to others and no university or individual will receive credit for it until it has seen the light of day through publication”(Hyland, 2009, p.2). Thereupon, the notion of publication led to the appearance of academic writing for publication purposes. Researchers have provided lists, models, textbooks in order to help NNs to write their research papers.

At the organization level, Kanoksilapatham (2005) suggested a template of RAs rhetorical structure in Biochemistry after analyzing sixty (60) RAs. This template can facilitate the process of writing RAs in this field. Swales (1990, 2004) proposed a model of article introductions : Creating a Research Space (CARS) after investigating the structure of articles in different fields of science; other researchers like (Posteguillo, 1999; Adnan, 2009; Samraj, 2002; Shehzad, 2010) carried rhetorical analysis on RAs in different disciplines for the aim of supporting existing templates or revealing differences for the aim of facilitating RA writing for NNs scholars.

At the linguistic level, Kaplan and Baldauf (2005) provided a list of unclear or ungrammatical sentences NNs scholars should avoid. Other resorts for NNs scholars are textbooks; Swales & Feak (1994) designed a textbook out of research and teaching experience to help graduate students with their academic writing following a rhetorical approach. The textbook is composed of units in which the organization or the different moves of the different sections in RAs are presented with some specific focus on grammar. The interest in academic writing for publication shows how important is the style, grammar, and structure of the RA to be disseminated in top journals and get the idea acknowledged by a large number of scholars. Moreover, it reveals the quality of difficulties NNs scholars encounter when writing RAs which is going to be the heart of the next section.

1.7.1 Difficulties in writing for publication in English.

The challenges of writing for research publication have been the interest of many researchers. It has been treated from two (02) different angles as researchers divided it into discursive challenges covering language, style, rhetorical structure, and effect of L1 on L2, and non- discursive including funding, NS Vs NNs analogy, and editors and reviewers bias. The following session is meant to cover discursive challenges that hinder writing for scholarly publication in English.

1.7.1.1 Structuring texts.

When talking about structuring or modeling texts, we mean the division of RAs into sections in which moves, steps, and sub steps are present. Accordingly, Gosden (1992) focused on the linguistic and socio-pragmatic skills required in writing research. He tried to explore factors effecting editors' considerations of submitted papers. The questionnaire was given to thirty six (36) science journal editors. They responded that ideas' importance is their main concern, and then they focus on grammatical accuracy and the logical and clear arguments. Consequently, awareness rising about the international conventions of research writing was recommended.

Moreno, Rocha, Burgess,Lopez-Navarro,& SAchdev (2012) proposed in their study about Spanish researchers' difficulty in writing RAs for English medium journals the rhetorical transfer hypothesis as an explanation of those writers difficulty. They claimed that Spanish researchers seem to be reluctant to criticize earlier works in literature which is acceptable in Spanish medium-journals gatekeepers, yet this lack of critical attitude has transferred to the rhetorical structure of their writings in English causing them problems in the publication process.

Many researchers, on the other hand, tried to solve the problem of structuring NNs different RAs sections by analyzing the rhetorical structure of one section in published articles by adopting different models existing in the literature to recommend them for novice researchers. The introduction section took the lions' share in the analysis using Swales CARS model (1990; 2004) by all of (Posteguillo, 1999; Kanoksilapatham, 2005; Adnan, 2009; Samraj, 2002;

Shehzad, 2010; Loi, 2010). After the analysis of the corpora, some researchers suggested modifications in the model like Samraj (2002) while the majority confirmed its effectiveness.

The discussion section came in the second place of interest as it is considered as the most difficult section to be rhetorically organized. Peacock (2002) analyzed 252 RAs from different seven disciplines: Physics, Biology, Environmental Science, Business, Language and Linguistics, Public and Social Administration, and Law as he believed in the urgent need to teach research writers the move structure of the discussion section taking into consideration the interdisciplinary and NS/NNs variation. He also tried to prove that the moves in the discussion section reverse the order in introduction section .The model adopted in the analysis was of Dudley-Evans (1994), but the researcher came out with a modified version of this model. The third category of researchers carried analysis on RAs as a whole; Kanoksilapatham (2007) analyzed the move structure of the four sections namely introduction, methodology, results, and discussion of Biochemistry RAs. In the analysis, Kanoksilapatham built upon different models existing in the literature to build a model of fifteen (15) moves that can be used as an input in course designing for research writers.

When tackling the difficulties in organizing RAs, those previously mentioned researchers approached the topic from a different perspective; they chose to find solutions to the problem by developing models that can be used for pedagogical purposes. In other words, teachers of English for research publication purposes can use those models to teach novice writers the structure of RAs different sections. Researchers even tried to carry comparative studies between RAs in different languages or disciplines to be aware of such differences when applying different models

1.7.1.2 Syntactic problems.

In talking about language problems as an obstacle for scholarly publications, two (02) kinds of studies took place. On one hand, studies that are based on attitude surveys which did not carry any analysis at the textual level namely Flowerdew (1999) who questioned 600 Hong kong academics about publication in international refereed journals in English. He discovered that over two thirds of the population feels that they are at disadvantage compared with native speakers of English with about half of the population citing language issues as the main problem among other problems. Duszak& Lewkowicz (2008) conducted a survey of academics of

Applied Linguistics and Foreign Language Studies, Psychology, and Medicine to set out their attitudes towards publishing research. The respondents expressed mainly language difficulties.

Hanauer & Englander (2011) have carried a survey to 141 Mexican Spanish-speaking scientists from different scientific disciplines to measure the burdens in terms of difficulty, anxiety, and dissatisfaction. The results of the study showed that writing in English is far different from in Spanish. The difficulty was rated as 24%. Li (2002) designed a study aiming at measuring Mainland Chinese doctoral researchers' confidence in writing research papers for international publication. After collecting 154 questionnaires and conducting in depth interviews with 15 doctoral students and five supervisors, the results showed that doctoral students in different disciplines have a high level of confidence in writing and publishing international research papers with a relative deficiency in using the English language.

Tardy (2004) tried to explore the perception of international graduate students at an American University towards the dominance of English as a lingua franca and its role in scientific communication through a small scale questionnaire and focus group interview. He found out that students identify problems in English use but they support having a common language for scientific communication. Moreno, Rey-Rocha, Burgess, López-Navarro, and Sachdev (2012) questioned 1,717 Spanish postdoctoral researchers about their specific problems in writing RAs for English medium journals apart from problems related to being at disadvantage in comparison to native speakers, and the result showed that the source of difficulty is the lower level of language proficiency especially in the discussion section and this latter can only solved if a higher level is realized.

On the other hand, textual studies of language problems in writing research papers for international publication are few in comparison to the first group. Gosden (1995) focused on "mechanical editing", using "Japanese- English reference texts", translation or borrowing from expert author texts from L1 as main writing strategies of junior scientists to produce a successful research paper for publication. Interestingly enough, Flowerdew& Li (2007) carried a study on shapers who rule the editorial process of Chinese novice scientists' RAs for publication. The study took several years of data collection from doctoral science students and their supervisors at a university in Mainland, China in which they considered the role of shapers in editing novice scholar's international publication attempts.

Strengths and weaknesses of supervisors, peers, language professionals, and editorial services were the focus of the study. Findings suggested that for the first source of correction, the problem is supervisors' time limits that prevent them from checking all papers in addition to variety in competence levels that urge those novice scholars to refer to other sources of correction. For the second shaper, peers, the value of their role is highly appreciated, yet they suggest a problem of the unacceptable request for co-authorship in return of their efforts in editing papers. Next, language professionals, they find their job rewarding during face to face meetings with authors who explain their intentions behind each sentence. Finally, novice scholars rarely refer to editorial services due to financial obstacles.

Studies carried on difficulties in writing RAs namely language difficulties vary between exploratory and textual, yet they all share the same purpose of shedding light on the challenges the researchers in different disciplines face in order to achieve scholarly Publication. Interestingly enough, the findings of those studies in different context should be used in developing programs, trainings, and courses to equip novice scholars with the necessary skills to write and disseminate their RAs.

1.7.1.3 Style.

In looking for cultural variation in research genres, Yakhontova (2002) compared between English and Ukrainian\partly Russian conference abstracts giving more consideration to the generic organization of texts. The study corpus was made up of 45 abstracts of which 15were written in English by native speakers, 15 written in Ukrainian, ten in Russian, and other 15 abstracts were written in English by Ukrainian \ and or Russian researchers that all belong to Applied Linguistics. The difference after the analysis was significant at the organizational level between English native abstracts and Ukrainian\ Russian ones; however, both groups were consistent in the way they structured their texts.

Referring to style, the native speakers' abstracts were characterized by being clearly cut and emphasizing the originality of the research it was tackling to impress the reader. For the Ukrainian and Russian abstracts, the description of the research was global looking like short research papers giving more attention to the continuing and non-conflicting character rather than the originality. For the last group of writers, their abstracts had an eclectic mixture of both

features of the first and second group to be called intergenres. In fact, some of them succeeded in following the Anglo-Saxon standards which made their chance in publishing their works higher while others failed in some positions and succeeded in others. Thus, cultural differences may be an obstacle in writing and structuring research following international conventions.

For approaching the notion of the style from editors' perspective, Flowerdew (2001) interviewed editors of 12 leading international journals in Applied Linguistics and English language teaching. The aim behind the study was to view the way those editors see the idea of NNs publication in their journals and at the same time figure out a way to increase the chances of those writers in publication. The results indicated that editors have shown a kind of sympathy towards NNs, but some problems cannot be neglected like the parochialism, or failure to show the relevance of the study to the international community. The reason behind parochialism is not always the relevance or the importance of the research results but the failure of the writer to highlight the importance of his obtained results to the international community of scholarship. Writers are unable to generalize their results and move from the local to the international context. In addition to parochialism, the absence of authorial voice or researchers' authority to say that he is part of the DC seem to be a major problem for many editors.

Stylistic problems in research writing generally stem from the cultural background of the writer; researchers seem to be effected by their original languages when writing RAs. The effects appear clearly in the different features as the rhetorical organization, the linguistic choices, ideas presentation, and authorial voice of the writer. All those features threat the membership of those researchers in the international community of scholarship.

1.8 Writing Strategies for Publication in English

Due to the different confronted discoursal challenges, NNs are urged to use strategies to overcome those obstacles; however, it is unlikely that one strategy is the fire-full solution. In reality, researchers try to seek help from members of manuscript shaping procedure, follow already published texts, or rely on their first language to write RAs for publication. In the following section, the aforementioned strategies will be explained.

1.8.1 Seeking assistance of research articles' shapers.

The first strategy that authors may use is seeking assistance from different experts in shaping the manuscript. To start with, the author of the article is the first shaper of the manuscript as he is the first responsible of revising the manuscript in terms of the scientific content and the linguistic one. For the latter, international conventions exist about writing RAs, and it is the role of the author to respect them and detect any problems that concern this area as softwares are unable to accomplish this task (Burrough-Boenisch, 2003).

The second shaper in the prepublication process is the co- author or PhD supervisor (Hasrati, 2005; Li, 2006;, Li,2005). Gosden (1995) & (Li, 2005) studied the different Japanese supervisors' textual changes made to their students. Gosden (1995) interviewed both the authors and their supervisors about the changes at different stages of producing the manuscripts. Results that were focused on discussion and results sections showed that supervisors made some changes in terms of framing texts like adding transitional words to show cause and effect purposes, revision of cohesive devices, and rhetorical changes as Japanese authors are not aware of the inductive nature of research writing in English.

Moreover, Lillis &Curry (2006) stated that shapers can be language professionals whose concern is the linguistic revision of the manuscript namely: copy editors, translators, proofreaders, and discipline specialist; their concern is the scientific material presented and journals guidelines' respect. For the role of editors, Gosden (1992) stressed the role of editors in terms of language criteria in shaping manuscripts. Accordingly, he questioned 154 editors from UK, USA, and Canada. The results showed that editors play a significant role in revising cohesion and coherence of texts and rhetorical structure of results and discussion sections. Most importantly, Gosden stressed the task of the authors revising minor problems in their papers and avoiding total reliance on the revision of editors and reviewers. Similarly, Flowerdew (2000) & Li (2006) sought to understand problems faced and strategies followed by NNs in publishing in per-reviewed journals. In following his one –informant case study, Flowerdew (2000) demonstrated how the editors' five pages report helped in revising the final submitted article.

In addition, Li & Flowerdew (2007) in analyzing the problem of language "re-use" among Chinese doctoral students writing for publication in different disciplines, indicated the importance of model texts that students use to develop their manuscripts. In fact, Chinese doctoral students consider following model texts as a necessary strategy in writing their research papers; nevertheless, they may fall in the trap of plagiarism by borrowing passages, phrases, or ideas without acknowledging references. Editors consider this problem as serious in research writing, and can raise the authors' awareness to different shapes of plagiarism. In the main, authors have several, as previously mentioned, assistance providers, yet this strategy can be hindered by some obstacles like when authors totally rely on the editors' revision without revising minor errors (Gosden, 1992), or when copy- editors tailor the manuscripts according to the journal outlook not according to the author purpose as it was the case in Flowerdew(2000) case study when the copy- editors reoriented minor details to be the most significant arguments in the article submitted for publication. Alternatively, authors refer to substitute this strategy by referring to their mother language.

1.8.2 Relying on the mother language and technical language.

In writing their RAs, NNs may use their mother tongue to complement their second or foreign language deficiency. In a study carried by Li (2005), a doctoral student wrote his first English research paper in Chinese in a period of a week; then spent a month and a half translating it to English. Again, Li (2007) explored the procedure a scholar goes through to write for publication in an English- medium journal. The process log was the tool used to examine the procedure of writing. Interestingly, the results showed that before writing a section in the article, the author wrote the plan in his mother language (Chinese), and whenever he got stuck, he returned to his mother tongue as a refuge.

On the other hand, Gosden (1996) collected data from Japanese novice researchers about their writing practices during writing their first RAs in English. As a result, the researchers' main stages can be viewed in terms of four procedures namely:

1) Starting by writing the full paper in Japanese; then, translate it to English to write the first draft.

2) Developing a plan of “only main flow of ideas” in English and translate it to English to write the first draft. In both procedures, sentences are formed when writing in English (Gosden, 1996, p.115)

3) Writing notes in English that are developed into sentences to form the first draft

4) Writing the first full paper in English.

The strategy of using the mother language seems to be effective for some researchers; however, it is time consuming as the authors need to write the article in their language and translate it (Li, 2005).

Technical language is the third strategy NNs scholars opt for when writing their RAs. Sionos (1995) wrote an article about the different communicative strategies used by French scholars to compensate for their linguistic deficiency in writing manuscripts. In fact, the researchers of his case study demonstrated an interest in content over form due to the poor command of language. They believe that facts and figures can speak for themselves. Consequently, the result was the rejection of their articles due the excessive use of mathematical language. On the whole, using the mother language hinders the process of learning English by researchers, and using the technical language is an obligation. Nevertheless, researchers should be aware of the place and the extent of using technical language. As a response, NNs researchers can solve the problem by referring to modeling published texts.

1.8.3 Modeling published texts.

The fourth strategy that is commonly used among NNs is modeling texts; it refers to modeling texts rhetorical moves or borrowing expressions from RAs. First, modeling moves, Li (2005) followed the development of a doctoral student in using English in writing RAs; the student changed the structure of his introduction in different drafts, and explained that he followed the common structure of the articles he read in English. In fact, the student used the conventional moves of a RA introduction (Swales, 1990, 2004) unconsciously after reading articles. Two years later, Li (2007) conducted a similar study that had similar results; the doctoral student imitated the moves existing in different articles he read.

Second, borrowing from literature is a tactic NNs researchers use during writing their RAs (Li 2005, 2006a, 2007). Authors may borrow phrases (Li, 2007), structure of sentences, or

even whole passages (Flowerdew& Li, 2007). In modeling texts, authors may reproduce sections' wording falling in the problem of plagiarism, yet they justify this by trying to be honest in transforming information as they model texts that are sharing the same area of research as theirs (Li, 2006a). Moreover, Li& Flowerdew (2007) demonstrated that borrowing from texts takes two forms; respondents may keep notes of useful expressions they meet during reading literature like transitional words, technical terms, and reporting verbs, or they take articles for the purpose of selecting language that can be used during the process of writing. In this case, they may copy and paste sentences from articles to use them in writing their manuscripts with or without acknowledging references. Another example of using the tactic of borrowing is illustrated in the study of Davis (2013) who tried to carry a longitudinal study on four Chinese students to investigate the development of post graduates' sources' use. The aspects that were under focus were citation, reporting verbs, paraphrasing and attribution. The results indicated that students development went through four stages; stage one was characterized by students copy pasting from internet websites without citing the reference, and even with the training they received, two students continued their reliance on source texts 'structure and words.

Dealing with modeling texts raises the debate about the issue of plagiarism. Many researchers tried to demonstrate the motives behind NNs borrowing from published texts. Some RAs' authors indicated that they refer to borrowing from texts to show honesty in transferring knowledge; the case is that those authors borrow from texts that are almost the same as theirs and are urged to borrow to prove honesty (Li, 2006a).In other cases, authors believe that language "re-use" is acceptable to a given extent (Li & Flowerdew, 2007), and in other cases a lack of awareness about conventions of borrowing from texts was the reason(Davis, 2013). Consequently, Li and Flowerdew (2007) and Davis (2013) suggested that NNs authors of RAs should develop language proficiency to avoid borrowing from texts and falling in the problem of textual plagiarism in addition to raising awareness about the rhetorical moves followed in RAs writing. In the main, authors use different strategies to achieve the goal of publication; this aim is preceded by a whole procedure the manuscript goes through. The following section will cover the editorial and publication procedure in details.

1.9 Editorial and Publication Procedure

The submission of RAs is the first step in the journey of publication that includes many other steps. Robetrts, Coverdal, Edenharder, & Louie (2004) demonstrated the different steps of the editorial and publication process. In the figure they designed, they showed that the author starts by preparing the manuscript. In this process, he writes the paper following the international conventions along with the chosen journal regulations. Henceforth, the notion of choosing the right journal appears on the scene. The first factor to consider is the area of research the journal covers. The RA research field should be compatible with the journal scope to avoid rejection. The second factor is the prestige; researchers generally publish their papers to get grants or promotion. Therefore, the quality of the journal is crucial; scientific committees consider RAs published in prestigious journals that are the target of most researchers in the field. The third factor is the frequency factor; journals differ between monthly, bimonthly, and quarterly (Day, 1998). Accordingly, the researcher should choose a journal with a high publication frequency to have more chances for acceptance.

After preparing the manuscript and choosing the journal, the submission step comes. Actually, the procedure depends on the journal guidelines. The author should follow the instructions indicated in the journal home page. Commonly, journals guidance falls into three (03) categories: The journal scope or research area and the editorial policy, manuscript presentation, and manuscript submission (Hames, 2007). Successively, the editor triages the paper (Robetrts,Coverdal, Edenharder,& Louie2004), and the main reason for rejection would be inappropriateness to the journal field. In case the paper is initially accepted, the next step would be peer review. This process will be well developed in the next section.

The reviewers, then, send their reports about the paper, and the editor writes the editorial letter which is a summary of the reviewers' reports, suggestions for revisions, and the final decision about the manuscript. The decision can be a rejection for the paper, acceptance for publication without revision, or invitation for the author to resubmit the paper after carrying revisions recommended by the reviewers and the editor (Dudley Evans & Flowerdew, 2002). The manuscript re-goes through the same first procedure by being resubmitted, goes through editor revision, peer review, and final decision. Finally, if the manuscript is accepted, preparation

for publication starts. Robetrts, Coverdal, Edenharder,& Louie (2004,p. 82) attempted to present the editorial and publication procedure through the following figure:

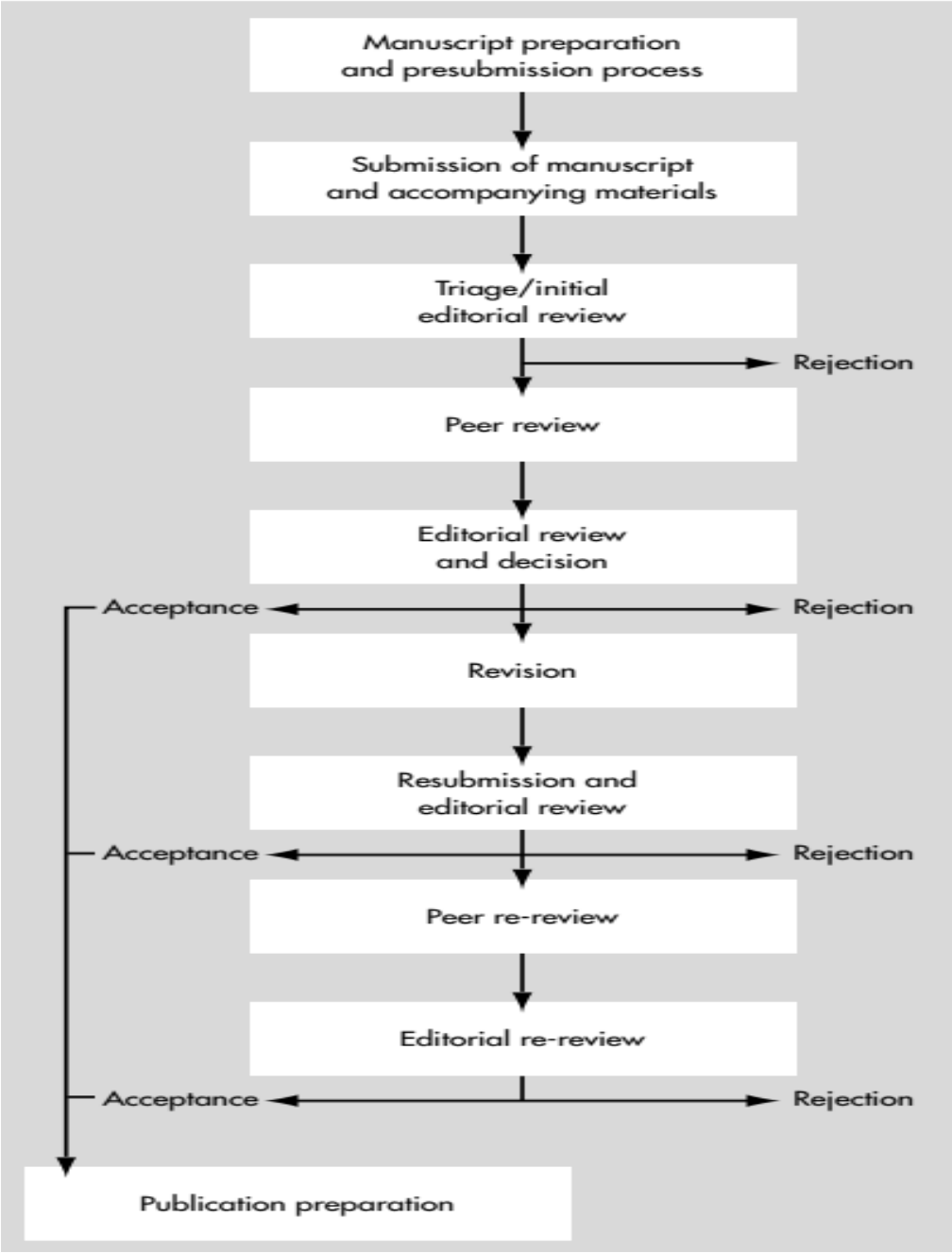


Figure 1.2 Editorial and Publication Procedure (Robetrts, Coverdal, Edenharder,& Louie, 2004,p. 82)

1.9.1 Editorial procedure.

In analyzing the editorial letter genre, Flowerdew (2002) presented the editing procedure in *English for Specific Purposes* journal; it starts by receiving the manuscript and removing the name and any other signs of the author identity to prepare it for blind review. Next, the editor chooses two reviewers who can be either from the editorial board and have shown interest in the subject area or experts from outside the board that share interests with the author. The manuscript is sent to the reviewers who should provide a feedback in a period that goes from two (02) to three (03) months. After reading the manuscript and the review, the editor writes the editorial letter that is a summary of the reviewers' reports, suggestions for revisions, and the final decision about the manuscript.

In some occasions, the submitted paper does not deserve being sent to the reviewers for the major faults it contains or for being outside the journal scope; instead, the manuscript can be rejected outright or extensive revisions are suggested. Alternatively, if the revisions are minor, the editor can do them without referring to reviewers. Surprisingly, Gosden (2001) explained that it is common in many scientific fields and in some journals like *the letters journal* that the identity of both the author and the reviewer is known for both; he added that the authors are even invited to suggest the names of referees that have interests in the same research area. Therefore, we can understand that the editorial procedure differs depending on the journal policy and the field it covers. For instance, in scientific domains, the factor of time is very important which urges journals editorial boards to give the author the right to choose the reviewers to gain time and keep up with the changes that can occur.

1.9.2 Peer- review procedure.

Gosden (2001) summarized the review procedure as the technical review of a submitted manuscript after receiving it from the advisory editor, or the re-review of the same paper when the editor decides that the needed revisions have not been carried by the author. To exemplify, Bornmann, Weymuth, & Daniel (2009) described the review process in *Angewandte Chemie,* a prime chemistry journal in the world, that after passing by the editor, the submitted manuscript is sent to several independent reviewers .The referees review the paper using a structured

evaluation form along with another sheet for comments.The assessment is made out of five inquiries:

(1) ‘‘How important do you consider the results reported?’’

‘‘Very important; Important; Less important; Unimportant’’.

(2) ‘‘Do the data obtained by experiment or calculation verify the hypotheses and conclusions?’’ ‘‘Yes; No’’.

(3) ‘‘Is the length of the manuscript appropriate to its contents?’’

‘‘Yes; No, the manuscript is too long; No, the manuscript is too short’’

. (4) ‘‘Do you recommend acceptance of the Communication?

‘‘Yes, without alterations; Yes, after minor alterations; Yes, but only after major alterations’’ ‘‘No’’).

(5) ‘‘If you are of the opinion that the contribution is not suitable for publication in Angewandte Chemie International Edition, please indicate which other journal you consider more appropriate.’’ (Bornmann, Weymuth, & Daniel, 2009, p. 496).

On the other hand, the separate comment sheet is devoted for referees’ answers to the questions on the evaluation form in free text, and they can add any other aspects that may influence the editor decision.

Actually, the review process has been the focal point of numerous researchers. Hill, 2016; Alam, 2015;Wincka, Fonsecab, Azevedob, &Wedzicha, 2011; Spigt and Arts, 2010; Robetrts,Coverdal,Edenharder,& Louie,2004 attempted to explain the review procedure; they gave examples of structured review reports of manuscripts (Spigt and Arts, 2010) in different fields due to the absence of objective guidance for the procedure. In fact, reviewers learnt how to review through personal experiences by reviewing or receiving reviews (Hill, 2016).

As an illustration of researchers’ guidance, Robetrts, Coverdal, Edenharder, & Louie (2004) propose that the fundamental normal components in peer review incorporate “comments to the author(s)” and a rating form including “confidential comments to the editors.”They added that an effective review should cover both the advantages and the limitations of a manuscript, and they provided a checklist used for evaluation in the *Academic Psychiatry* journal. Fonsecab,

Azevedob, &Wedzicha (2011) recorded the reviewer's duties as providing honest constructive assessment of the manuscript, accepting to review papers that cover his research area, reporting unethical performances like plagiarism, writing the report in a constructive manner, and confidentiality. Additionally, Hames (2007) abridged primary focuses a reviewer ought to consider while setting up his report. He began with the language that should be clear especially for NNs. At that point, the report ought to be objective and constructive. Another imperative perspective should be highlighted is the issues to be assessed in the review procedure. The following table summarizes the main aspects assessed by reviewers:

Table 1.1

Aspects Assessed during the Review Process **(**adapted from Robetrts,Coverdal,Edenharder,& Louie,2004; Spigt and Arts, 2010; Wincka, Fonsecab, Azevedob, &Wedzicha, 2011; Bornmann ,Weymuth , Daniel; 2010)

Research questions and problem statement	The problem statement should be clear and concise The research questions should be relevant and complete
Originality of the work	The work should have some original aspects like the questions it answers, the methods used, or any controversies it sheds light on.
Relevance	The paper should be relevant to the journal scope. The study addresses important, new t issues and add new perspectives to the existing literature
Research Design	It should be appropriate, well described, adequate, and plausible It should have internal and external validity
Instrumentation, data, and population	They should be clearly describe, appropriate to the research design

Statistics and data analysis	Data analysis should be well described, appropriate to the research design. Qualitative research should be based on words Data in qualitative research should be reliable, valid, and empty of bias
Literature review	The review should be of convenient references, includes analysis and critique, and well integrated The references should be up to date and the number should be acceptable
Discussion of results	The results should be properly interpreted The flow of ideas should be logical Important points in discussion should be highlighted
Ethical issues	Ethical problems are identified The work should be compatible with ethics of research
Clarity of the paper	The paper should be well structured Format of texts, figures, and tables should be carefully chosen to present data The logical flow of ideas and arguments should be respected The paper should follow the journal guidelines in terms of structure All the article sections should be complete and comprehensible

Accordingly, the last word in framing the decision about the acceptance or rejection of a manuscript is based on referees' reports that had an important share in reproducing the manuscript. Researchers tried to explain the procedure, give structured examples of reports, and give guidelines for reviewers in different fields to enhance the quality of review reports. The final report plays a critical role in enhancing the quality of research and in the editors' decision.

1.10 Conclusion

The present chapter has provided the theoretical framework of the study that draws on the notion of DC and LPP belonging to social Constructivism principles. Moreover, the chapter introduced English as a Lingua Franca influencing the world of academia taking Algeria as a case in point. Writing for research publication purposes is defined, difficulties in writing this genre are summarised, and strategies used by NNs to overcome those obstacles are explained. At the end, the chapter provided a description of the editorial and publication procedure of RAs written for international publication.

Actually, the theoretical insights helped in the design of the research tools aiming at exploring both difficulties and strategies in our context. Furthermore, the notions introduced envisaged the international academic context of the study as it provided an image of the different variables at play in the research publication procedure at the international level. In the next chapter, different approaches to discourse analysis will be introduced including move analysis as a basic approach to be adopted in this study. Then the RA as an independent genre will be described stressing the generic structure of its varied sections.

Chapter Two

Chapter Two: Discourse Analysis and Research Article Genre

Chapter Two

Discourse Analysis and Research Article Genre

2.1 Introduction

In the previous chapter, we aimed at providing a historical and theoretical background to the use of English as a language of scientific publication. The different variables at play in the publication procedure were introduced. We have gone through the difficulties encountered and the strategies adopted by researchers to surpass those problems in addition to an overview of the research dissemination process. Nevertheless, for the purpose of writing for scholarly publication, the researcher should be equipped with scientific field knowledge in addition to linguistic and structural aspects of research articles genre.

The present chapter aims at presenting the different textual approaches to discourse analysis namely: genre analysis, rhetorical move analysis, corpus analysis, and multimodal analysis. The approaches differently view discourse varying from linguistic and structural angles to social and contextual ones. However, they share one aim of providing researchers with the necessary linguistic and structural characteristics. The second part of the chapter is designed to give both analytical and critical vision of the varied sections in the RA shedding light on the different models developed by researchers reflecting the rhetorical structure of each section under the umbrella of rhetorical move analysis approach.

2.2 Approaches to Discourse analysis

The emphasis of approaches in discourse analysis goes under two different poles. The first one is textual in nature. The linguistic and rhetorical aspects of research articles for publication are the main focus of analysis going under this area. This kind of analysis aims at equipping RAs authors with the necessary linguistic and structural knowledge about them for effective performance. The second one is about the social and contextual aspects of RAs to understand how they are shaped and how they can be published. In the following sections more information about those approaches will be exhibited.

2.2.1 Textual approaches.

Textual approaches are mainly influenced by linguists putting text in the center and context in the background. It is mainly about linguistic choices, semantics, and texts patterns of organization. It includes all of genre analysis along with move analysis, corpus analysis, and multidimensional analysis

2.2.1.1 Genre analysis.

The notion of genre is defined differently by researchers, yet the main definition goes to Swales (1990) who defined it as the shared communicative purposes between the discourse communities. Later, Swales (2004) again developed the definition of genre suggesting that genres can be seen as forms selected from a range of possible forms of language to be repeatedly used to understand and demonstrate competence in a DC. Genre analysis (GA), on the other hand, approaches texts qualitatively and quantitatively adopting a range of tools and attitudes. In other words, it can be an examination of individuals' actions creating texts and the decisions they take or the examination of the distribution of a genre features and rhetorical choices (Hyland, 2009).

Genre Analysis has different types stemming from the different understandings of language and its relation to the social context. Systemic Functional Linguistics, English for Specific Purposes (ESP) and New Rhetoric are behind those different perspectives. Genre analysis as an ESP approach is described by Hyland (2013) as the analysis of texts deep structure to understand how writing works as communication, so genre approaches in ESP seek to identify

discoursal and lexico-grammatical patterns of genres to identify their structural identity. Interestingly, this perspective follows Swales (1990) tradition of move analysis which aims at identifying the different rhetorical steps writers use to develop their social purposes (moves) and the systematic patterns of those moves in a particular genre. In the main, studies of genre in ESP are concerned with moves and steps that form the discoursal structure of a text or what they refer to as move Analysis (Paltridge, 2013).

Swales (1990, 2004) CARS model was the pioneering move analysis of RAs introductions. Many researchers were inspired by this model to carry analysis on RAs in different fields on large varying numbers of corpora (Posteguillo, 1999; Kanoksilapatham, 2005; Adnan, 2009; Samraj, 2002; Shehzad, 2010). Subsequently, Studies of genre in ESP have shifted to the use of English in a particular setting in particular genres. English for research and publication purposes or writing research articles for publication, for instance, was dealt with by many scholars (Hyland, 2009, 2008, 2004a, 2004b, 2006; Flowerdew, 2013; Konoksilapatham, 2007). In the following section, a detailed description of move analysis and background of this approach are going to be provided with examples of studies that adopted this kind of analysis.

2.2.1.2 Rhetorical move analysis.

Rhetorical moves were originally developed by swales (1981) in describing the rhetorical move structure of RAs. A move is a text section that presents a communicative function and contributes to the communicative purpose of the text, and move analysis is the description of a text communicative purpose through dividing it into moves; some moves are frequently used to be called conventional while optional moves are less frequent than the conventional ones. Simultaneously, moves are not the smallest functional unit in a genre as steps are elements that contribute to the communicative function of the move (Swales, 1990).

To recognize moves, objectively identified linguistic boundaries are used, so Kwan (2006) suggested a functional approach based on cognitive judgment to identify moves; He pointed out that each move has a local purpose that goes in hand with the overall communicative purpose of the text. In using move analysis, Swales (1990) who was the pioneer used move analysis to help NNs advanced learners. He analyzed 48 introductions of RAs in different disciplines to propose series of conventional and optional moves that was later called Create A

Research Space model (CARS). The latter has been widely used to analyze RAs introductions in different fields and different settings extending its use from teaching rhetorical structure of articles to comparing the structure of articles in different fields or even in different languages.

In fact, RAs were the main original focus of move analysis. Researchers went on by analyzing the different sections of RAs to propose models for NNs of English that need to write for research publication purposes. Peacock (2002) and Dudley-Evans (1994), Holmes (1997), Moyetta (2016) worked on the discussion section; Thompson (1993) and Williams (1999) analyzed the moves of results sections; Kanoksilapatham (2005), Maswana , Kanamarub, & Tajino (2015) attempted to analyze all the sections of articles.

Following this tradition, the present study will be carried adopting the most dominant models to investigate rhetorical moves organization difficulties in RAs written by Algerian researchers. The DC professional members in this case are reviewers and editors of journals; they have defined conventions in terms of the moves organization that writers are supposed to follow. Henceforth, the models that are the fruits of those conventions will be used to diagnose Algerian submitted articles deficiencies. In the study, the analysis will be carried on a corpus of articles from different discipline; therefore, it is crucial for us to explain what corpus analysis is. The details are going to be presented in the following section.

2.2.1.3 Corpus analysis.

To start with, a corpus is a collection of naturally used language for the objective of analysis, and the analyses are held through encoding large databases of texts electronically. Corpus analysis does not reflect any theory, yet it provides a solid basis for GA avoiding any kind of bias when looking at one text (Hyland, 2006, 2009). Methods in corpus analysis can be quantitative and qualitative using frequency and association in the interpretation of data. First, frequency is considered as key notion in corpus analysis; it is about how frequently a given word or grammatical pattern is used in a particular genre. Consequently, this word or pattern would be considered as significant component of that genre. For instance, Coxhead (2000) examined a corpus of 3.5 million words of academic texts to come out with a list of 570 most frequently used word families that may not apply for other kinds of texts. Tse and Hyland (2006) examined

frequency of metadiscourse in 84 book reviews from three different disciplines. The results revealed that the corpus included an average of 65 per text.

Second, association is about identifying how features associate with each other to form patterns through qualitative analysis. In practice, when analyzing the corpus, researchers are able to uncover the use of a target word through the surrounding text. One word can have a different significance depending on other words around it or the "semantic environment" (Hyland, 2009). Apparently, corpus analysis has provided a ground for the different approaches of discourse analysis, yet it was criticized for its view of discourse as a product not as a process, its concentration on frequent patterns of language rather than all patterns, neglecting the non verbal meanings, and disembodying the data from the surrounding environment (Hyland, 2009). Simultaneously, another approach in text studies appeared on the scene.

2.2.1.4 Multimodal analysis.

To bridge the gap in the previous approaches that focus on linguistic patterns, lexical choices, and macrostructures of texts, multimodal analysis came to cover other aspects of texts in addition to the printed words. Multimodal approach has appeared as a result of internet dominance in the world and the movement from purely verbal texts to visuals in different genres. Printed texts are accompanied with other aspects like images, graphs, figures, and photographs (Breeze, 2014; Hyland, 2009).

In practice, researchers felt injustice when dealing with texts separated from other aspects that take part in the readers' understanding of the text (Breeze, 2014). As a case in point, articles in online newspapers contain different modes of expression on the printed text: headline, text, photograph, caption, advertising and other modes like hyperlinks to related stories, discussion boards or comment boxes, and interactive advertising. In such a scenario, those modes almost grab all the attention of the reader in comparison to the text portion (Breeze, 2014). The current approach has also been applied in different disciplines. In education, for instance, Halloran, Tan, & Marissa (2015) introduced teaching and learning multimodal literacy to develop students 'critical thinking. During the analysis of multimodal texts and videos, the emphasis is put on teaching and learning analytical vocabulary to arrive at a multimodal meaning.

In having a deep look at language research, we can understand that even with new approaches like move analysis, GA, corpus analysis, the focus is still on the text in its written form neglecting other aspects like reading, listening and speaking, and the aim is still the system of rules that governs text language and format as it was for traditional linguists (Belcher, 2006; Prior, 2013). Linguists reacted to the technological revolution in all life fields mainly media by developing the multimodality that have been adopted in discourse analysis, teaching critical skills, and teaching multimodal literacy. In addition to written texts, other aspects that are the result of globalization are taken in consideration.

2.2.2 Contextual approaches.

In fulfilling the different communicative purposes, students face problems in terms of "the discursive realities of the professional world" (Bhatia 2008, p.161). Consequently, textual analyses are accompanied by researchers with other kinds of qualitative and interpretive data (Hyland, 2011) to cover the contextual aspects of texts and their authors. Ethnographic studies are deemed great interest in contextual studies; they gather data about texts and participants as occurring in their natural setting with normal conditions for a given period of time with watching the case and asking the participants (Hyland, 2011).

Several sources of data are used like participant and non-participant observation, in-depth interviews, surveys, focus group discussions, diaries and biographical histories (Hyland, 2009). To illustrate, Prior (1998) attempted to study the process of writing of graduate students at US university by analyzing transcripts of seminar discussions. To study the context of writing, he used observation of institutional context, tutors feedback, and conducted interviews with both tutors and students. The study provided an in depth understanding of the procedure students go through to negotiate writing tasks and get socialized with their disciplinary communities.

Another case is Li' study (2006b) in which a student of Physics' experience of writing and publishing an article was followed. In such case, the role of the supervisor, the editor, and the reviewer were stressed to demonstrate the significance of their role in helping the student carry the six revisions of her article and get it published after several resubmissions. In fact, ethnographic studies were criticized for their lack of rigour and subjectivity, but defenders of this

approach claim that interaction with writing context provides rich first handed- interpretation about the process of writing (Hyland, 2009).

2.3 Research Articles

Research article is a type of academic writing with specific characteristics in addition to the common ones shared by all types of academic writing. Buckingham (2008) explains that priority in writing RAs is given to language packaging or how knowledge is communicated rather than the content to be displayed. Moreover, the RA structural organization plays a similar role in understating the subject, so the coming section provides more details about this concept.

2.3.1 Generic structure of research articles.

When reading a research article, the structure gives the impression that the task of writing was not complicated; in fact, RAs are designed to give such an impression and seem more convincing to the reader; nonetheless, the novice writer should take other factors in consideration. Swales and Feak (2012, p. 285) demonstrated the rhetorical shape of a typical RA as the figure shows:

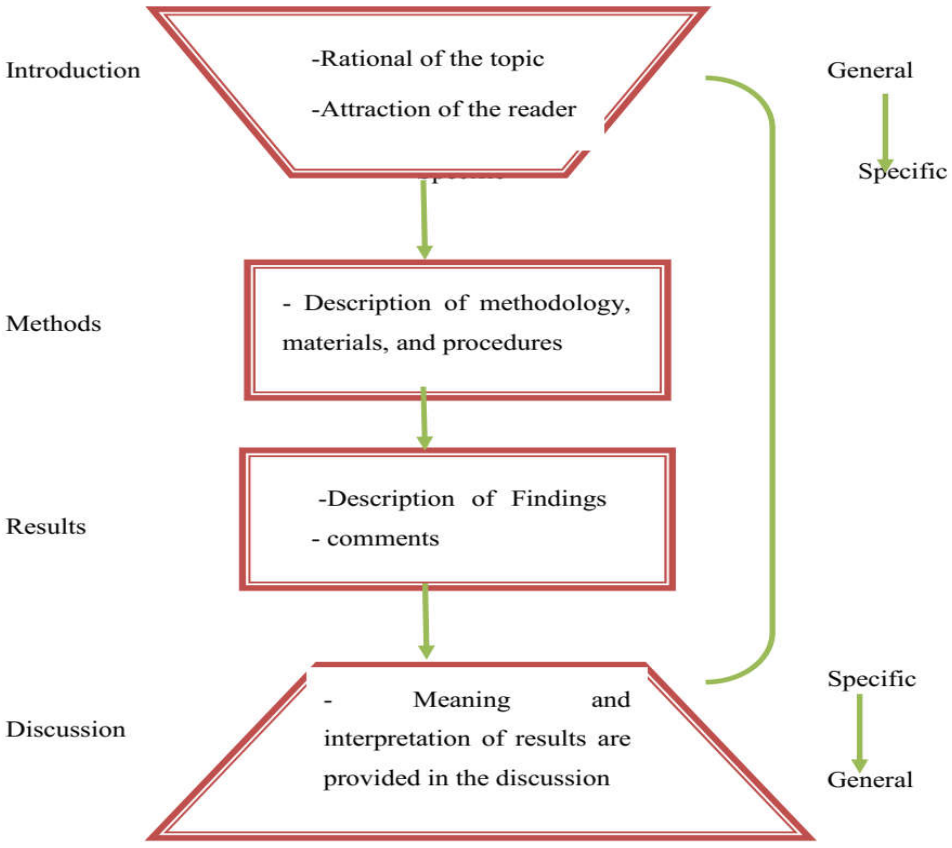


Figure 2.1 The Shape of a Research Paper (adapted from Swales & Feak, 2012, p. 285)

The arrows in the figure indicate connections between RAs different sections; a relation of moving from general to specific is between the introduction and the discussion sections. On the other hand, the results section reflects the methodology section as every single result is related to a given method.

Swales and Feak (2012) went on by assigning a purpose for each RA section. The introduction opens the article by providing the rational of the topic moving from a general discussion of the topic referring to previous literature to the specific question or hypothesis investigated via the article with considerable attention to having the readers' interest .Next, comes the methodology section which is considered as the narrowest. In effect, this sections' main concern is describing with different levels of details the materials or respondents, procedures, and methodology in general. Third, findings are announced accompanied with comments in the results section. Finally, the contribution of the article is shown through the discussion section as results are explained and interpreted with reference to points earlier raised in the introduction.

In a study about RAs structure, Lin and Evans (2012) tackled the generic structure of 780 RAs derived from 20 leading journals in 39 different disciplines. The articles were first categorized into empirical, theoretical, and review articles. Concerning the empirical RAs, 433 RAs were under analysis, yet 53 RAs follow the Introduction, methods, results, discussion (IMRD) structure. In reality, different patterns of organization were identified orderly:

Introduction, literature review, Methods, Results and discussion, conclusion

Introduction, methods, results and discussion, conclusion

Introduction, methods, discussion, conclusion

Introduction, literature review, methods, results, discussion, and conclusion

Moreover, the IMRD structure presented with swales and Feak (2012) did not consider the literature review sections and conclusion section that seem to be indispensable in the 433 articles analyzed by Lin and Evans (2012).

Surprisingly, a brief look at research in ESP yields into studies on RAs focusing on the IMRD structure treating the review of literature as part of the introduction and the conclusion as part of the discussion . On the whole, RAs do have main sections like the introduction, methods, and results; nevertheless, the macro structure differs depending on the discipline. For instance, Yang and Allison (2004) analyzed 40 RAs in Applied Linguistics to come out with the introduction, methods and results as the main elements in addition to other sections like theoretical basis or pedagogical implications. In Computer Sciences, Posteguillo (1999) found that the introduction section is conventional and obligatory in RAs he analyzed, but the results section is optional by being present in half of the corpus, yet the discussion / conclusion section is present in 85% of 40 RAs. Correspondingly, the nature of the discipline imposes the generic structure of the article. In the next section, the macro structure of the different RA sections will be presented tackling the different studies carried on the rhetorical patterns of each section, and models developed out of those studies.

2.3.2 Structure of research articles' sections.

In writing their RAs, researchers may follow the IMRD format to structure their papers. However, other formats exist in literature as adding the conclusion section or joining both the

discussion and results sections together. Actually, in addition to the general structure of the RAs, there exists an internal ordering inside each section. An explanation of this idea will be thoroughly demonstrated in the following sections.

2.3.2.1 Abstract.

The abstract is an informative map of the different RA sections; it helps in selling the article as it is the first section to be read. Consequently, researchers gave much attention to analyzing the structure of abstracts. Salvager –Meyer (1990) carried an analysis of seventy seven (77) medical English abstracts written between 1986 and 1989 and drawn from 37 different journals. The study was a response to critics addressed to medical abstracts as being unstructured. Effectively, the results indicated 52% of the corpus as well structured abstracts while 48% of the abstracts suffer from lacking one fundamental move or lack of one or two necessary moves in addition to the illogical presentation of moves.

He proposed a six moves model:

M1. Statement,

M2. Purpose

M3. Corpus/Methods

M4. Results

M5. Conclusion

M6. Recommendation.

Afterwards, Bhatia (1994) proposed a model for structuring abstracts that is composed of four main moves orderly:

M1: Introducing the purpose

M2: Describing the methodology

M 3: Summarizing the results

M4: Presenting the conclusions (as cited in Daraba, 2016).

However, when Dos Santos (1996) investigated the organizational structure of 94 abstracts from three leading journals in the field of Applied Linguistics, five moves were revealed namely

M1. Setting the general field of research

M2. Short comings of previous research

M3. Describing the study design

M4. Stating major findings

M5. Drawing conclusions or offering recommendations.

When comparing the two models of Bhatia and Santos, it seems that the moves of Bhatia (1994) are similar to Dos Santos (1996) last four moves. In fact, the difference lays in the first move which is similar to swales (1990) move of the CARS model" establishing the territory". As a matter of fact, the Models can be criticized for being single discipline reflection which can prevent generalizing them to other disciplines.

On the other hand, analysis of disciplinary differences in abstracts took a good share of the area. Hyland (2000) investigated the rhetorical structure of 800 abstracts from eight different disciplines namely: Biology, Physics, Electronic Engineering, Mechanical Engineering, Applied Linguistics, Marketing, Philosophy and Sociology. Though the structure was different between the disciplines, a unified model was proposed by Hyland (2000). In the model, five different moves were suggested after being found in 95% of the analysed corpus. Noticeably, the purpose was drawn as an independent move from the introduction. The five moves are:

M 1: the introduction: Establishes context of the paper and motivates the research

M 2: Purpose: Indicates purpose, outlines the aim behind the paper

M3: Method: Provides information on design, procedures, data analysis, etc

M4: Product: Indicates results and the argument

M5: Conclusion: points to applications or wider implications and Interpretation scope of paper (as cited in Behnam, 2014, p.175)

Hylands' (2000) framework has been followed in many research studies carried on different disciplines. For instance, Daraba (2016) analysed abstracts in Applied Linguistics, Applied Mathematics, and Applied Chemistry to find out that different disciplines follow different move structures. Behnam (2014) also used the framework of Hyland (2000) in his analysis of abstracts in Mathematics and Applied Linguistics. Interestingly, abstracts in Applied Linguistics follow a conventional scheme; however, the abstracts in Mathematics exhibit a different pattern of rhetorical moves. Therefore, the model is not fitting to all disciplines.

Another significant study was carried by Samraj (2005) on abstracts of 11 RAs in two related disciplines: Biology and Wildlife Behavior. Bhatias' (1994) model was adopted in the analysis. The results showed that all of the purposes, result, conclusion sections were present in almost all the corpus. Nevertheless, the method move was present in six abstracts, yet the abstracts of the two disciplines share the same rhetorical structure in terms of moves frequencies.

The genre of RA abstracts proved again variation of rhetorical structures in different discipline through the study undertaken by Kanoksilapatham (2009). The corpus of the study was composed of RAs' abstracts from Biochemistry, Microbiology, Civil Engineering, and Software Engineering with an analysis aiming at investigating the move structure and order of information sequencing. The results of the analysis were summarized in a model of five moves:

M1. Background information

M2. Statement of purpose

M3. Description of methodology

M4. Announcement of results

M5. Discussion, conclusion, implication

However, by having a quick look at the analysis details, variation of structures in the different disciplines is dominating. Apparently, result and discussion, conclusion, implication moves are the most frequent moves in the abstracts of the four disciplines. The five moves were present in the abstracts of Microbiology and Biochemistry, but the first two moves of background information and purpose were absent in the other two remaining fields.

To conclude with, the different rhetorical organization studies of RAs' abstracts have aimed at describing their structure to facilitate the mission of writing it for NNs, yet a clear difference between the disciplines tackled dominated the scene. By analyzing different abstracts from different disciplines, researchers arrived at suggesting models presenting common moves shared between the texts. The comparison between the models of all of Salvager –Meyer (1990), Bhatia (1993), Dos Santos (1996), Hyland (2000), Samraj (2005), and Kanoksilapatham (2007) yielded in the following model which is so far similar to the model of Hyland (2000). This framework will be used in the corpus analysis of the next two coming chapters.

M1. Introduction: statement of the topic or establishing the topic of research

M2. Purpose: the aim of the study

M3. Methods: describing design, procedure, analysis

M4. Results: announcing major findings

M5. Conclusion: application, implications, recommandations

2.3.2.2 Introduction.

Among the different RA sections, the introduction grabbed the researchers' attention in the field of GA. The work of swales (, 1981, 1990, and 2004) was a revolution by presenting his CARS model after analyzing RAs introductions. The aim behind Swales work (1990) was to help NNs professional and advanced learners in reading, writing, and publishing their RAs. The study covered move analysis of 48 RAs from social sciences, medicine, and physics in order to develop a framework of the common moves between the introductions.

Move 1:	**Establishing a territory**	
	Step 1	Claiming centrality **and/or**
	Step 2	Making topic generalization(s) **and/or**
	Step 3	Reviewing items of previous research
Move 2:	**Establishing a niche**	
	Step 1A	Counter-claiming **or**
	Step 1B	Indicating a gap **or**
	Step 1C	Question raising **or**
	Step 1D	Continuing a tradition
Move 3:	**Occupying the niche**	
	Step 1A	Outlining purposes **or**
	Step 1B	Announcing present research
	Step 2	Announcing principal findings
	Step 3	Indicating RA structure

Figure 2. 2 CARS Model for Research Article Introductions, adapted from Swales (1990, p. 141)

Three basic moves are included in the model:

M1. Establishing the territory plays the role of introducing the topic of research.

M2 Establishing a niche is aimed at indicating a gap or an area of research to be investigated. **M3** Occupying a niche is designed to introduce the topic purpose and results in light of what have been presented in **Move 1** and **Move 2**.

Moving to a lower level of steps, **Move1** can have three steps; step one: claiming centrality is a statement of the importance of the topic under investigation or by claiming that the topic was object of analysis by many researchers; this step can be but not necessarily at the beginning of the first move (Kanoksilapatham, 2007).To illustrate this step, Swales (1990, p144) uses this extracts:

– The study of…has become an important aspect of…

– A central issue in…is the validity of…

Move 1, step2 making topic generalization takes generally the form of statement of knowledge, statement of practice, or descriptions of phenomenon (Swales, 1990). Examples of this step are as follows:

–The aetiology and pathology …is well known.

– A standard procedure for assessing has been …

– There are many situations where… (Swales, 1990, p. 146)

Move1. step3. Reviewing items of previous research is the area where the writer reviews selected research works and relate them to his research work; both integral and non integral citations are possible in this part. The three steps are options for the writer to establish his territory of research.

Move2. Establishing a niche is considered as a key move as it establishes the link between **Move 1 and Move 3**(Kanoksilapatham, 2007). **Move2** plays the role of pointing the significance of the investigation carried. Four main steps can be used optionally to realize the communicative purpose of this move. First, **counter claiming** in which the writer opposes, challenges, or indicates a weakness in previous research:

Example:Emphasis has been on …….with scant attention give to (Swales, 1990, p. 154).

Second**, indicating a gap in previous research** to demonstrate that problems or research questions have not been sufficiently addressed by earlier works: example:

The first group .....cannot treat and is limited to..... (Swales, 1990, p. 154).

Third, **Question raising about previous research** to suggest that further work is needed

Example: Both suffer from the dependency on..... (Swales, 1990, p. 154).

Finally, continuing a tradition in which the writer presents his work as an extinction of previous research .for example:

A question remains wether..... (Swales, 1990, p. 154)

A final move is **M3, occupying the niche**; it is the part of the introduction in which the writer places his work and proves his active role in accomplishing it instead of referring to previous studies or stating the need for filling a research gap in the two preceding moves .**Move**

3 defines the research through either stating the purpose or describing the aim, then announcing principle results, and finally indicating the RA structure.

Swales (2004) revisited his model and developed a new framework. **Move 1** is realized through topic generalization with required citation. For **Move 2**, can be realized through indicating a gap in previous research with possible citation or either through adding to what is known or through justifying research in reference to the real world (Samraj, 2002). For **Move3,** presenting the present research many changes have taken place in response to later studies carried investigating the applicability of the model to different fields.

Move 3	**Presenting the present work (citation possible) via**	
	Step 1	(obligatory) Announcing present research descriptively and/or purposively
	Step 2*	(optional) Presenting RQs or hypotheses
	Step 3	(optional) Definitional clarifications
	Step 4	(optional) Summarizing methods
	Step 5	(PISF**) Announcing principle outcomes
	Step 6	(PISF) Stating the value of the present research
	Step 7	(PISF) Outlining the structure of the paper

*Step 2-4 are not only optional but less fixed in their order of occurrences than the others

**PISF: Probable in some fields, but unlikely in others

Fig2.3 CARS Model (Swales, 2004)

Swales (2004) explained that the new options in **Move Three** are possible in some research fields depending on their nature, on the researcher situation, and on the discipline conventions. In effect, the use of those steps gives more value to the introduction and motivates the reader to finish reading the article. Both frameworks of Swales (1990, 2004) were adopted in many studies in different fields. For instance, Anthony (1999) evaluated CARS model (swales, 1990) by applying it to 12 RAs' introductions in Software Engineering. The results indicated that the similarity between the analysed introductions and the model applied is high, yet Anthony (1999) claimed that the step of evaluating research should be added to the last move as it

represents a significant section in software engineering introductions. The modification that was also considered is adding the coordinating conjunction to the first three steps in the second move to show the possibility of realizing this move with the three steps together.

A second example is Samraj (2005) who carried a comparative study between the rhetorical moves in abstracts and introductions of RAs in Conservation Biology and Wildlife Behaviour. Again, the analysis of introductions was conducted adopting Swales model (1990) to find out that the moves of introductions in Conservation Biology are similar to the ones in the framework. In other words, move one was realized through claiming centrality; move two was realized trough indicating a gap, and move three was realized through announcing principal findings. On the other hand, the field of Wild Life Behavior demonstrated differences in terms of moves realizations; the first move was realized through centrality claim in just six introductions, and in the other six RAs, this step appeared in the abstract. For move two, the realization was through presenting a problem in the real world, and move three was realized through background discussions.

Differently, Kanoksilapatham (2007) examined the rhetorical structure of 60 RAs in the field of Biochemistry. For the introduction section, the researcher developed a framework out of previous studies carried by all of Anthony (1999), Samraj (2002), and Chu (1996) (as cited in Kanoksilapatham, 2007). The framework is similar to Swales CARS model (1990) as it is composed of three moves; the first move is establishing a topic that aims at indicating the importance of the research which resembles claiming centrality in CARS model. The second move is preparing the present study; this move can be produced through either indicating a gap or raising questions. Finally, move three is introducing the present study; like in the model of swales (1990), it aims at demonstrating the active role of the researcher through presenting the contribution of the work. The three steps that come under this move are purpose statement, description of the procedure, and presentation of results. The application of the framework resulted in high rates of agreement between its moves and the patterns of organization in the introductions of the analysed articles. (Kanoksilapatham, 2007) established a rule that when a move is existing in 60% or more of the whole corpus, it is considered as obligatory. In reality, move one and three proved presence in 100% of the introductions, while move two was present in 66% of the corpus.

On the whole, the rhetorical structure of RAs' introductions has again proved that difference in disciplines is an important variable to consider; the analysis of the above mentioned works suggests that different frameworks resulted from different fields, yet a basic framework is dominating. Swales (1990) CARS model has proved its efficiency as adopted by different researchers but modifications in reference to the nature of the fields should not be neglected. By comparing the different models proposed by researchers, Kanoksilapatham (2007) framework seems to be representative; therefore, the analysis of the introductions in the next coming two chapters will be based on this model.

2.3.2.3 Methods section.

In comparison with the introduction and discussion section, methods section structure has received less attention from researchers except for cases in which the whole article is under focus. Nwogu (1997) analysed 20 RAs from five medical journals to find out that the methods section is formed up with three main moves. First the section starts with describing data collection procedures (source of data, size of data, criteria of selection); then, the second move is about describing experimental procedures (the apparatus used, the experiment). Finally, data analysis procedure is described (instruments, data classification). Nevertheless, checking the model moves displays how it serves applied fields rather than theoretical ones like history, and it is the result of analyzing one field.

Another study was carried out by Lim (2006) who illustrated the linguistic features related to different communicative purposes in the methods section. The intent behind the study was to demonstrate the results significance in teaching grammatical structures associated with communicative functions to NNs in an academic context. The analysis was carried on a corpus of 20 RAs from two prestigious journals in the field of Management. Lim (2006) pointed out the presence of three main moves: describing data collection procedure including the description of the sample, the sampling technique, and justifying the procedures used in data collection. Move two is about describing the design and justifying the methods of measurement; finally, Move three is about data analysis procedure. The model differs from Nwogu (1997) in adding a new move of justifying methodological choices, yet it is the result of analyzing one field which may prevent generalization.

From another perspective, swales and Feak (1994) believed that the methods section is the first section to be written for many reasons. They claimed that the priority is given due to the clear content of this section; the writer does not need to discuss what does not work, yet this RA part is very significant as good methodology leads to good findings. Methods section can be put under different headings like materials and methods, or it can be separated into sections under subheadings like procedures, statistical analysis, or participants of the study. In addition, the nature of the field decides the quality of information provided. Like with other sections, methods got its shares of the research market.

Peacock (2011) identified the rhetorical moves in 228 RAs methods sections published in fields of Biology, Chemistry, Physics, Environmental Science, Business, Language and Linguistics, Law, and Public and Social Administration. The results were arranged in a model of seven moves.

M1. Overview: it is the introductory part of the section in which a short summary is presented. This move was mainly present in Public and Social Administration field (54%), Environmental Science (50%), and Law (42%).

M2. Research aims, questions, or hypotheses; it is about the question or hypotheses investigated with a description of the corpus; this move was dominating in all of Public and Social Administration (67%) and Law (58%).

M3 is subjects and /or materials; it varies depending on the nature of the field; this move was strongly present in all fields except in Environmental Science (31%).

M4 is Location; it is about the place of research and possibly the justification for the choice of the place. Different from the previous move, this move is highly present in Public and Social Administration (75%), Environmental Science and Law (58%).

M5 is procedure; it explains the procedures of obtaining data, and it is the only move that proved presence in all sections of all fields (100%).

M6 is Limitations which explains the disadvantages of the method used; it is mainly found in Environmental Science (69%) and Business 44% , but it was absent in all method sections of Physics and Chemistry.

M7 is data analysis; it proved high rates of presence in all fields.

This study has shown the variation between disciplines in terms of rhetorical moves. In fact, the nature of research has a great role in deciding the moves; for instance, location in Physics is not considered as a significant variable that may influence results. Therefore, the writer does not need to mention it (Swales and Feak, 2012). For that reason, location move was absent in all method sections in Physics. Another remark is concerned with Move one, two, and six (overview, aims/question or hypotheses, and limitations); the three moves are almost absent in all of Physics, Biology, and Chemistry. This can be explained by the hard nature of those fields as they rely on scientific concrete results without giving much attention to theoretical concepts.

Additionally, Swales and Feak (2012) assumed that methods sections can be either condensed or extended. In a condensed section, the writer does not mention all the details about the research under investigation as the audience is supposed to have relevant background about the area; he can even go further by using acronyms like "A corpus was designed following Romer (2010)…" (Swales and Feak, 2012, p. 297). In an extended methods section, details of all the procedure, materials, subjects, equipments are presented. This kind of explanation is provided in case of new methods, multidisciplinary audience, or the RA is based on the method.

Furthermore, through the analysis of Biochemistry RAs and analysis of models existing in literature, Konoksilapatham (2007) arrived at recommending a model for the whole RA. As far as the methods section is concerned, four moves are proposed. The first move is about describing materials by listing them, indicating their source, and providing background about them. The second move is about describing experimental procedures by giving background, details, and "documenting established procedures" (p.76). The two first moves were present in all the analysed articles. The third move is mainly about equipments use in the research; it was found in 10% of the corpus. Finally, a description of statistical procedures is provided in the fourth move that was present in 13% of the corpus.

At the outset, through checking the aforementioned studies, we notice that the models are discipline dependent. In other words, the moves found in hard sciences seem to be the same in all the studies (Nwogu, 1997; Peacock, 2012; Konoksilapatham, 2007), yet some additional moves proved their presence in other fields like with the move of location and overview in the study of Peacock (2011). Nevertheless, the possibility of developing a model out of those studies is possible after comparing them.

Outlining the models provides a common model made up of three obligatory and one optional move. To start with, the first move is about the description of the sample (Lim, 2006), materials (Konoksilapatham, 2007), and subjects/and or materials (Peacock, 2011). The naming depends on the field. In this move, description of the size, source, and background are provided about the materials. For peacock (2011), both move three and five (subjects/and or materials and procedure obtained to collect data) refer to the first move in other models. Secondly, describing experimental procedures was absent in Peacock (2011) model but present in the others. This move function is detailing the procedure of measurement, providing background of the procedures by explaining methods, and presenting an overview of the standard experimental processes that are known in the field of research.

In addition, move three is optional; it is about detailing equipments. This move has appeared in 10% of the articles analysed by (Konoksilapatham, 2007). Next, Move four is about describing data analysis procedures; it was strongly present in (Nwogu, 1997; Peacock, 2011; Konoksilapatham, 2007; Lim, 2006). Practically speaking, the choice of the moves is the result of comparing the models existing in literature taking in consideration the disciplines' characteristics. The fields under study in the practical part of this work are applied in nature which justifies the presence of the second move though it was absent in Peacocks' (2011) model and the third move which was described as optional in other frameworks. For justifying methodological choices move (Lim, 2006), it was left to the next section of results.

2.3.2.4 Results.

Like the methods section, results section has received scant attention from genre analysists. Researchers are divided into two groups: group one are those who analysed RAs as a whole, and the result section is part of the article. As a case in point, Nwogu (1997) who, after the analysis of 20 medical RAs, summarised the results section into two main moves: indicating consistent observation which is about recounting all the information about the observation made in the research, and indicating non consistent observation which is about negative results that do not go for the expected outcome. The second move is optional as researchers tend to present the significant results in their research. The model seems to be reflective for Medical Sciences.

Konoksilapatham (2005), as a second example, worked on a corpus of 60 RAs in the field of Biochemistry to outline a model of four conventional moves. In the first move which is made up of four steps, the writer refers for a second time to methodological issues like stating the aim of the research, research questions, and hypotheses. In the second move; two steps are present. The researcher should justify his procedure and methodology by referring to previous research. In the third move, results are stated through two steps. Lastly, the fourth move is about commenting the results by providing interpretation and evaluation of the findings through five steps.

In Konoksilapatham (2007), the model has been slightly changed. The first move name has changed to be restating methodological issues with the same number of steps. The second move name has become justifying methodological issues with no steps. The third move is announcing results with three steps instead of two. At last, move four is commenting results instead of stating comments on the results.

The second group of researchers is of researchers who focused their works on the rhetorical analysis of results section. Firstly, Brett (1994) who carried a genre based study on 20 results sections in the field of Sociology for Pedagogical Implications. The moves were lexically, grammatically, and functionally described, and the result section was independent from the discussion section in the corpus. The findings indicated three categories of moves: metatexual, presentational, and commenting categories. For the first category, texts are playing the role of indicating data or other kinds of written texts; the second category as the name suggests is about texts aiming at presenting data; and the last category is about presenting, interpreting, and evaluating data. The model differs for the previous one in missing to restate methodological issues and justify them. This may be explained by the nature of the discipline as it seems less experimental than Biochemistry, and the data has a textual nature.

The second case is Thompson (1993) whose corpus of analysis was 16 RAs of one Nobel Prize winner biochemist. The approach in the study was chronological (from 1948 to 1990) as to check the effect of time on the quality of moves followed in the result section. However, Thompson (1993) realised that the results drawn from one case cannot be generalized to other articles in the field of Biochemistry. Henceforth, he decided to add 20 experimental RAs in

Biochemistry from two journals. The discussion and results were separate sections in the articles subject to move analysis.

The results revealed that communicative purposes were categorized under seven different moves, but the frequency of each move is not similar in both cases. To say it other ways, the moves that seemed to be conventional as they strongly appeared in the 36 RAs' results section are methodological justifications, interpretation of data, evaluation of data, and pointing out or explaining discrepancies. On the other hand, the move of citing agreement with previous studies is less present in the articles of the biochemist; this refers to the novelty of the area of research that he was working on. Additionally, the move of suggesting further research is totally absent in the 20 articles as it is found in the discussion section. The last move is about admitting perplexities in interpreting data; the presence of the latter was meager in the biochemist RAs in comparison to the rest of the corpus, but no explanation was provided.

All in all, the analysis of RAs results section rhetorical structures in different disciplines has reflected how the nature of the discipline recommend the kinds of functional categories existing in RAs published in journals active in the field. Nwogu (1997) study is a strong proof of this concept with his analysis of medical RAs that proved to be unique supporting the nature of Medical Sciences that are based on observation. Nevertheless, the possibility of having a common model for related disciplines is still possible as the communicative functions are similar, but they only differ in names.

By comparing all of Konoksilapatham two models (2005, 2007) and Thompson (1993) model in Biochemistry, and with reference to the nature of the fields that are going to be subject to the rhetorical analysis in the practical side of the work, we can assume that the results section can be written through the following moves:

Move one is about restating methodological issues like technical procedures which can play the role of refreshing the readers' memory about the aim of the study and the research questions to be answered.

Move two is about justifying the use of procedures, techniques, and all issues related to methodology by referring to previous research.

Move three is about stating results that can be through interpreting and validating findings.

Move four is about commenting, evaluating, providing limitations of the study. In the choice of the model moves, the discipline was a major variable.

Konoksilapatham two models (2005, 2007) and Thompson (1993) were the results of analyzing articles in Biochemistry which are considered from the same family of the sciences treated in this work namely: Biology, Agricultural Sciences, and Earth Sciences. Scientifically speaking, Biochemistry brings Biology and Chemistry together to solve biological problems.

2.3.2.5 Discussion.

Move analysis of RAs discussion section has received extensive attention from researchers. Swales and Feak (1994) suggested after analyzing 15 articles from a small U.S. regional journal of History that three main moves compose the discussion section starting by the obligatory move of consolidating results this cover all of methodology, literature comparison, and consolidation of results. The second move is limitations and the third move is suggesting further research noting that the last two moves are optional. Actually, the problem with this model is first in the field it reflects. History is known for its theoretical nature and distinctive rhetorical structure in comparison to other fields (Holmes, 1997), which means that the model cannot be applied to other empirical fields. Furthermore, models are mainly developed in literature to facilitate novice researchers' mission in publishing in acknowledged or prestigious journals, but the journal from which the corpus was taken is described for being a small one.

On the other side, Holmes (1997) enlarged the scope of his study to cover RAs from three disciplines Namely History, Political Sciences, and Sociology. He indicated move structure of the discussion section in 30 RAs (ten from each discipline). The RAs were published in high standard journals, and they were restricted to a period of two years. The model adopted for analysis is summarised into eight moves:

Background information

Statement of results

Comment on expected and unexpected results

Reference to previous research that can be for the aim of comparison in terms of results, procedures, objectives, or assumptions, or it can be for the purpose of supporting the present research findings

Explanation of unsatisfactory results: in which the writer gives justification for surprising results

Generalization move: is for the purpose of claiming generalization of the results or the limits of research preventing generalization

Recommendation in which further research is suggested

Outlining parallel or subsequent developments: in this last move, the writer attempts to summarize data from a period subsequent to the one covered in his RA or about a closely related topic; it is restricted to the field of History.

The analysis was done at the macro and micro levels. For Sociology and Political Sciences; the pattern of organization introduction-background-methods-results-discussion is almost the same; however, methods section proved absence in almost all history articles. For the micro level, it seems that no one move is completely obligatory in the discussion section. The most common moves are generalization and statement of results. As far as the other moves are concerned, move one of background information was present in 50% of the corpus; reference to previous research was present in 20 discussions; recommendations move was present in 17discussions, and finally (un)expected outcome was present in 11 discussions.

Holmes (1997) drew a conclusion that Political Science and Sociology discussion share the same rhetorical structure, yet History discussions exhibited a distinctive structure. The advantage of this framework is the extension of the corpus number in addition to the choice of prestigious journals from different fields. Nevertheless, the percentages of the moves existence do not imply any obligatory moves, and no clear cut distinction is made between obligatory and optional moves. Moreover, the choice of joining History with Political and Social Sciences does not seem to be a good one as History articles are different in the macro structure through the absence of the methods section which can automatically affect the other sections structure.

Moving to the field of Medical Sciences, Nwogu (1997) generated three main moves for the discussion section of Medical RAs that start with:

Explaining the general outcome of the research

Detailing specific outcomes

Stating conclusions

Each move has steps; move one is considered as the shortest as it states whether the objective of the study was attained or not; move two has five steps that are: stating specific outcome, interpreting the outcome, indicating the significance of the outcome, contrast previous and present outcomes, and indicating the limitations of the outcome. Move three is expressed through explaining implications of the study and suggesting a need for further research. Again, generalization is the problem with this framework. Relying on one field with a small sample cannot produce a framework to be generalized to all fields especially with the specific nature of Medical Sciences.

As the previous studies concentrated on a limited sample from few disciplines, Peacock (2002) investigated moves structure in 252 RAs discussion section (36 from each discipline) in seven disciplines: Physics, Biology, Environmental Science, Business, Language and Linguistics, Public and Social Administration, and Law, respectively adopting Dudley-Evans model (1994). The aim behind the study was to improve this model.

The framework that Peacock (2002, p. 492) came out with is composed of eight moves:

Information move: that may contain the aim of the study, the methodology adopted, or background information

Findings move: or statement of results with or without tables

Expected or unexpected outcome: to comment on results whether expected or not

Reference to previous research move: that can be for the purpose of comparing previous research with the present one or supporting the present research (Swales, 1990, p.173), **explanation move:** to provide justification for expected and unexpected results

Claim move: is used to explain the contribution of the study to research

Limitations move

Recommendations move: that can also suggest further research.

While the model of Dudley- Evans model contains nine moves

1. Information move (background about theory/research aims/methodology)

2. Statement of result (either a numerical value or reference to a graph or table)

3. Finding (same as statement of result, but without a reference to a graph or table)

4. (UN) expected outcome (a comment on whether the result is expected or not)

5. Reference to previous research

6. Explanation (reasons for unexpected results)

7. Claim (a generalization arising from the results: contribution to research)

8. Limitation

9. Recommendation (suggestions for future research) (as cited in Peacock, 2002, p. 481)

As a matter of fact, the study of peacock (2002) was based on proving the effectiveness of Dudley-Evans model without considering the disciplinary differences between the disciplines he worked on. A quick look at the seven disciplines under analysis shows that they totally differ like the case with law and Physics, yet peacock (2002) mentioned only one limitation to his model. He stated that the model cannot work for Public and Social Administration. Moreover, no clear cut division between obligatory and optional moves exists.

In the field of Applied Linguistics, Ruiying and Allison (2003) examined the rhetorical structure of 20 empirical RAs results /discussion and following sections from four established journals. The articles presented different sequences of sections: results and discussion, only the discussion section, conclusion only; pedagogical implications only; discussion followed by a conclusion; one discussion followed by pedagogical implications, conclusion, then pedagogical implication, and finally pedagogic implications section, then conclusion.

In analyzing results and discussion sequence, Ruiying and Allison (2003) indicated that both the discussion and results sections overlap in some moves; however, the main difference between both is that the main communicative function of the results section is presenting results while the discussion sections' role is commenting them. The main moves that form a discussion section are:

Background information

Reporting results

Summarizing results

Commenting results an obligatory move in which results are interpreted, accounted for, compared with literature, and evaluated

Summarizing the study

Indicating limitations and significance of the study

Evaluating methodology

Deducing from the study through drawing implications, recommending further research, and suggesting research.

We can notice that even some moves are present in both the results and discussion section, but they are different. For instance, reporting results is highly important in the results section while commenting results is dominant in the discussion section. In a nutshell, even the results and discussion sections overlap in some moves but still the difference is quantitative and qualitative in terms of the communicative purposes. The advantage of this study is taking in consideration the possibility of writing both the discussion and results sections in one section. Moreover, the model clarifies how some moves are to be distinguished from belonging to each section through identifying the communicative purpose of the move.

In the field of Biochemistry, Kanoksilapatham (2007) analysed a corpus of 60 RAs from the first five top journals in USA; he stated four main moves for the discussion section:

Contextualizing the study: can be realised through two steps: describing established knowledge and generalizing, claiming, deducing previous knowledge. In the former the study is situated in the discourse community by stating previous research that helps in the understanding of the present one. In the latter, the findings are related to findings of previous research.

Consolidating results: that has the role of defending the importance of the study; it is realised through six main steps: restating methodology including the purpose of the study, research questions, hypothesis, and procedure, stating selected findings, referring to previous literature for

comparison, explaining difference in findings, making claims or generalizations, and exemplifying.

Stating limitations of the study: like obstacles that prevents generalizability of the study

Suggesting further research: In this part, the writer proposes ideas for studies that can be an extension to his study

The advantage of this model is focusing on one discipline to avoid any possibility for variation. Moreover, the field under analysis is similar to the one chosen for the present study.

We have presented in this section the several models applied in analyzing moves structure of RAs discussion section in different disciplines. However, for the analysis of our corpus in the practical side, we need one single framework to adopt. Consequently, we need to compare and contrast those models to come out with one. By comparing the framework of Kanoksilapatham (2007) to other frameworks, we noticed that **Move one** (Information Move) is the same in Peacocks' model (2002), yet it is named background information in Holmes' model (1997). For **Move two** (reporting results); it seems that this move is dominating all models as its steps in Kanoksilapatham(2007) model are covered in M3,M4, M5, M6 in Holmes(1997) model , and covered in M2, M3,M4,M5, M6 in Peacocks' (2002) model. For **Move Three** (Limitations of the study), it is presented through **Move Eight** in peacocks model and **Move Two** in Nwogu(1997)**. Move four** (suggesting further research) is present as **Move Nine** in peacocks, **Move Seven** in Holmes(1997), and **Move Three** in Nwogu(1997). Therefore, Kanoksilapatham model (2007) seems to be the best choice for the analysis of our corpus as it covers moves present in the most significant frameworks in the area in addition to the nature of the field under study which seem to be similar to the ones in our analysis.

2.3.2.6 Conclusion.

As the conclusion is considered by many researchers as part of the discussion section (swales, 1990, Dudley- Evans, 1994), few studies have been carried on the rhetorical structure of this section as an independent one. Ruiying and Allison (2003) is a pioneering framework in the study of RAs conclusions as it is adopted by many researchers. After the analysis of 20 RAs in Applied Linguistics, it was revealed that 13 RAs contain a conclusion. The model suggests three main moves:

Summarizing research

Evaluating the study: it has three steps: indicating significance, evaluating methodology, and indicating limitations.

Deducing from research: through recommending further research and drawing pedagogical implications.

When having a look at both Ruiying and Allison (2003) discussion and conclusion structures, we notice that there are some common moves between them (summarizing the study and evaluating the study); this was explained by the fact that they share moves but the focus of each section is different. In fact, the main focus of the discussion is evaluating specific results and commenting on them whereas the conclusion is evaluating and commenting the whole study. The framework of Ruiying and Allison (2003) was used in the analysis of RAs conclusions in different disciplines.

Amnuai and Wannaruk (2011) used the model in a comparative study between RAs conclusions written in English and published in journals from Thailand and international journals. The analysis indicated the effectiveness of the model with some differences as the dominance of the first move in both types, but for move two and three the presence was higher in RAs published in international journals. To analyze the moves structure of conclusions in natural and social sciences, Aslam and Mehmood (2014) investigated the organizational patterns of 50 conclusions (25) from natural sciences and 25 from social sciences).As a result of the disciplinary variation , Bunton model of PhD thesis conclusion chapter rhetorical structure was added to develop a more effective model.

Another example is Adel and Moghadam (2015) who adopted the model in the fields of Psychology, Persian Literature and Applied Linguistics. Moreover, Zamani & Ebadi (2016) compared between conclusion sections of Persian and English RAs. The study was carried on 20 RAs from Civil Engineering and Applied Linguistics to prove the effectiveness of the model, yet there was slight differences in the frequencies of moves application. On the other hand, Bunton (2005) analysed the conclusion chapter of 45 PhD theses from different departments namely: Arts, Education, Social Sciences, Architecture, Engineering, Science, Medicine, Dental, plus the School of Business and the Centre for Urban Planning & Environmental Management. He came out with two frameworks; the first one is devoted to science and technology and the second is

devoted to humanities and social sciences. The former is composed of four moves; the first one is for claiming centrality; the second move consolidates research through evaluation and explanation of the findings; the third move is practical applications and recommendations, and the last move is recommendation of further research. The latter is made up of five main moves; the first four moves are similar to the first framework; the difference lies in the last move (concluding restatement) that explains the overall findings.

Through comparing the models proposed by Bunton (2005) and Ruiying and Allison (2003), we can assume that the outline of both models is the same, yet the difference lies in labeling moves and steps assigned to each move. Therefore, the model of Ruiying and Allison will be adopted in the analysis of our corpus in the practical part of the thesis because it was adopted by many researchers and proved its effectiveness in spite of the variation between those fields.

2.3.2.7 Bibliography or list of references.

When reading works about analyzing the generic structure of RAs, it is noticeable that no work covered the references list from the generic structure perspective. The main reason behind this is the difference between regulations applied by varied journals. In reality, some journals apply the APA style (American psychological association) which is considered to be the best for writing scientific papers, laboratory reports, and papers covering topics in the field of psychology, education, and other social sciences. On the other side, other journals apply the MLA style (Modern Language Association) as being the leading style for literary research and academic papers in the humanities field. The latter gives much detail when citing books and literary works in comparison to the APA style .Chicago styles is the third style to be followed in business, history, and the fine arts. Moreover, the styles applied by journals may change with the new versions edited each time. Therefore, the different steps followed are not permanent and cannot be generically analysed to come up with obligatory, optional, or conventional moves or propose models, yet the writer has to respect the journals guidelines in writing the reference list.

Nonetheless, the disability to analyze moves structure of references is not an underestimating of its role in the RA. The author should not neglect this section as it helps in giving validity to RAs, and it can be a technical reason for the refusal of a submitted paper. According to Taylor (2002) the main errors committed in writing references list in medical literature refers to writing names of authors, titles, journals, volumes, year, and page; however, soft -wares made this procedure safer and easier. Research generally on this section is presented in form of guidelines like the publication manual of APA or RAs that mainly talked about the accuracy of references (Siebers and Holt, 2000) and (Ngankee, Roachi, and Lau, 1997).

2.4 Conclusion

This chapter has covered the main textual approaches developed in tackling discourse analysis focusing on move analysis that represents the approach adopted in the analysis of the corpus of RAs. As a matter of fact, relevant information about rhetorical move analysis approach were sought to help in understanding the practical part of the study and the principles behind different choices in the analysis. Since the main tool of this research is document analysis, mainly RAs, we felt a need to introduce the RA generic structure notion.

In explaining the structure of each section, we synthesized the models developed in literature to come out with a common framework of the analysis in the coming chapters. The theoretical and empirical insights gained from the literature review are taken into consideration in the design of the research methodology. The next chapter includes an account of the research questions guiding this study, the research design framing it, and the instruments utilized to answer the questions.

Chapter Three

Chapter Three: Research Methodology and Design

Chapter Three

Research Methodology and Design

3.1 Introduction

In the literature review, theoretical concepts bearing on difficulties in writing research articles and strategies used to facilitate writing and organizing them were presented. The different sections of RAs were structurally described referring to models in literature, and the editorial and publication procedures were defined. This theoretical background paved the way for engaging in the practical part. On the other hand, the research methodology chapter aims at providing investigators with sufficient information to replicate a research work; it provides a complete description of the methods adopted in order to make the results reliability evaluation possible.

Thereupon, this chapter will shed light on the research methodology employed in the study including research setting, participants, data gathering tools, and analysis procedure. The chapter starts by providing theoretical background to the research approach and research design. Then an accurate description of pre-elementary stage is accounted for; this section is preparatory for the next stage of research by supplying the necessary information about the research participants. The last phase of research is qualitative in nature aiming at deep understanding of the problem. The chapter covers the exploratory stage of the rhetorical difficulties and strategies the sciences teachers go through to write for scholarly publication.

3.2 Research Approach

To investigate or describe a phenomenon in social sciences, scholars believe that a quantitative or a qualitative research paradigm is to be called. Quantitative research is based on a numerical presentation of the phenomenon; however, qualitative research is based on a narrative or textual presentation of the area under research (Dornyei, 2007). The advantage of quantitative research is the accurate reflection the sample may present in reference to the population. The possibility of generalizing the results is much higher in comparison to the qualitative one (Vandertoep & Johnston, 2009).

Dornyei (2007) describes the quantitative approach as being accurate, narrow, precise in measurement, and produces data that can be generalized to the whole population of the sample; however, its downside is the inconsideration given to individual differences. In quantitative studies, responses are averaged across the whole number of participants ignoring the variety between subjects.

Differently, qualitative research is difficult to define due to its non linear and cyclical nature. The researcher does not follow a straightforward procedure to obtain his findings, but rather he needs to move backward and sideway going through different sources of data to obtain an in-depth vision about the phenomenon under investigation. The advantage of the cyclical movement is getting a holistic meaning of the area of research (Neuman, 2007). On the whole, Qualitative and quantitative research are divergent in many aspects, but they may complement each other to give birth to a mixed method approach. In fact, a combination of data collection tools or analysis level may reflect adopting a mixed method research. In the present study, a mixed method approach of qualitative and quantitative collecting data research methods was utilized.

Actually, the study is qualitative as:

(a) It seeks a deep exploration of challenges and strategies applied during writing for research publication.

(b) It is based on qualitative data

(c) It aims at deep complex understanding of the issue (Croswell, 2007)

(d) The data is collected in natural setting and not in the laboratory

(e) The researcher is responsible of collecting data

(f) The main source of data will be an interview and documents

(g) A complex view of the problem is planned to be developed through describing, understanding, and clarifying the researchers experience in writing research (Croswell, 2013).

Nevertheless, the need for quantitative data was significant to collect information about the participants for the second phase of research, to have a vision about the participants' perceptions towards the difficulty in writing research and awareness about RA structure. In practice, a questionnaire was designed at the pre-elementary stage to identify the participants of the interview; in addition, the questionnaire results suggested candidates that may support the researcher with the necessary documents for the study. Most importantly, the questionnaire gave the researcher a preview of the participants' awareness of the RAs' structural organization.

3.3 Research Design

The global target of the present study is investigating the rhetorical difficulties Sétif University teachers of science encounter when writing for scholarly publication and the strategies they are urged to use to overcome those problems. More specifically, the study is guided by three research questions and three hypotheses:

Q1. What are the rhetorical difficulties that Sétif University sciences' teachers face when writing research for publication?

Q2. What strategies do Sétif University sciences' teachers use when writing for scholarly publication?

Q3. What changes at the rhetorical level do reviewers' reports bring to submitted research articles?

the three research questions have led to three research hypotheses:

1. In addition to scientific values, awareness and application of research articles' generic conventions are indispensable in the writing for publication process.

2. Adopting strategies during the process of writing may alleviate the challenges novice researchers may face when seeking membership in the academic community

3. Following research writing international conventions may reduce reviewers' remarks about RAs structure.

The understanding of the rhetorical difficulties calls for a move analysis of sciences teachers' submitted manuscripts and the final published articles after being reviewed. The communication with the respondents to have a clear view of the procedure was also of a great importance. Therefore, the study is exploratory in nature as it investigates the issue of publication in a real world context by interacting with people that are members of the DC (Croswell, 2007). For the research method, Stake (2005) states that case study is the best choice for carrying qualitative research. In fact, it is not a research methodology choice, but it is the choice of what is to be studied as it reflects the researcher not the method.

Case study is the study of a specific aspect about a single case. Yin (2009) named three conditions to be provided in taking the decision about the best suited research method namely: the type of research questions guiding the research, the control over the behavioral events, and the focus on contemporary events. In our case, the research questions are exploratory and broad seeking answers about university teachers practices in writing for research publication purposes; furthermore, the researchers is the one responsible of collecting data , yet the control over the events is slightly present. The focus of the study is not the historical development of the event, but rather on the contemporary event.

Dornyei (2010) described the case study as the best method to collect in depth data about a social phenomenon in its natural context; it is also presented as an effective way for generating methods and models. Consequently, the application of the case study method is better realised when accompanied with other research approaches specially as being part of a mixed method approach. In the present study, the case study is considered as the appropriate choice as the study is aiming at exploring a single group of researcher's practices of writing research in a natural context applying a mixed method approach (Stake, 2005; Dornyei, 2010)

3.4 Research Setting

The study took place at Ferhat Abbas, Sétif 1 University within the Faculty of Sciences that incorporates the following Departments: Basic Sciences, Ecology and Vegetal Biology, Microbiology, Biochemistry, Animal Physiology, Agricultural Sciences, and Earth Sciences. The questionnaire was administered at the level of all the departments through face to face meetings or via email. The interview was conducted with six participants selected after the questionnaires analysis in their offices at the university.

3.5 Discourse Community and Sampling

The DC in the study is doctorate holders and doctoral research students; they all have published at least one RA in an international, peer reviewed journal. They are from different specialties that are supposed to be from the same family namely: Biology with all its branches, Earth Sciences, and Agricultural Sciences departments in Ferhat Abbas, Sétif 1 University within the Faculty of Sciences. The questionnaire was designed to identify potential participants for the next phase. The sampling technique used is convenience sampling which involves selecting participants available or the researcher knows (Dornyei, 2007).

Actually, when trying to contact teachers at the different departments to fill in the questionnaire, they showed a scant readiness to cooperate, and they justified that by the overburdening tasks they have to fulfill, while others asked for sending the questionnaire via email, but no answer was received. Consequently, the researcher tried to contact teachers whom he knows to help. One teacher was the head of Animal Physiology Departments. On his turn, he forwarded the researcher email to his colleagues and contacted them to assure their response. After conducting the questionnaire with 20 teachers: four from the Department of Agricultural Sciences, two from the Departments of Esarth Sciences, and the rest are from the other different departments of Biology, six respondents from five (different specialties were purposively selected for the interview.

The choice of the participants was based on the aim of the research questions and the study (Dornyei, 2007). The interviewees have published more than one RA and showed difficulty in writing those articles in addition to their readiness for participation in the interview. Teachers that were selected for the interview welcomed the idea and showed interest to help in realizing the research as it touches upon their major problems in writing research.

3.6 Data Collection Instruments

3.6.1 Questionnaire.

The choice of the questionnaire as a research tool in this study stems from its advantage as an effective tool of collecting a huge amount of data from a large number of participants in a short period of time; the other advantage is the possibility of analyzing the questionnaire using softwares to get exact data (Dornyei, 2010). The questionnaire aims at:

- Collecting demographic data about respondents to decide about participants in the interview as the questions are turned around the publication journals and the procedure followed in publication
- Exploring researchers' awareness about the RAs different sections' rhetorical structure.
- Exploring challenges researchers face in writing, the extent to which they have it, and in which sections they have more difficulties.
- Obtaining results about the awareness of the RAs rhetorical structure to draw a comparison with reviewer's reports and their RAs move analysis
- Comparing the questionnaire results about the extent of difficulty with the reviewer's reports (which section received more comments)

3.6.1.1 Description of the questionnaire.

The questionnaire is composed of 30 items divided on three sections, and designed using Google documents application. The choice of the application arises from its effectiveness in organizing the different sections and questions in addition to the

easiness of answering questions that can be just in one click in multi -choice questions and closed -ended questions.

Section One: General Information

It is composed of three closed ended items aiming at collecting data about respondents' specialties and roles in research.

Section Two: Research Writing and English

It incorporates 11 closed ended items (question 4 to question 14). The main goal of the second section is providing data on which the decision about the participants in the interview is taken; the items mainly turn around having information of the journals kind the respondents published their RAs in, the main difficulties encountered in writing and organizing RAs, awareness of the RAs linguistic and structural aspects value, and information about difficulties during the publication procedure.

Section Three: Articles' Rhetorical structure: Awareness and Challenges

It starts from item fifteen (15) to item twenty seven (27). The first twelve (12) items are composed of two (02) parts for each; the first part is closed ended items testing the respondent's awareness of the different moves they include when writing a section in their RAs; this was managed by including moves that should not be part of the section. The second part is a rating scale item to measure the extent (None, a little, quite a lot, a lot) of difficulty faced in writing the different moves of a section. In this part, moves that do not belong to the section are removed. Item (28) is about difficulties encountered in writing the bibliography; it does not follow the same method in the previous items because there are no models in literature about the rhetorical structure of this section. Item (29) is aimed at eliciting the respondent's attitude towards recommending teaching English for professional academic purposes in doctoral curricular and to justify their answers in the last question.

The questionnaire was self designed referring to the review of literature especially from the second part of the second chapter; the answers were received via email or in face to face meeting by visiting the teachers at their offices or laboratories and ask for help. In fact, collecting answers took about two months as teachers' responses needed sending many emails reminding them each time to answer. In other cases, teachers asked

for rewards for their answers like accepting to edit their research papers. For language difficulties, the questionnaire instructions were translated to French as it is the language of instruction for the majority of the respondents.

3.6.1.2 Pilot study of the questionnaire.

At first, the questionnaire was pilot tested with four teachers of the English Departments at Sétif University. The remarks were mainly related to changing the options for testing teachers' awareness about different sections' structure to a table format. Meanwhile, another pilot study was conducted with the researcher supervisor who suggested adding the abstract and the bibliography sections to the questionnaire, gave remarks about linguistic errors and recommended avoiding open ended questions for enabling the researcher to control his data. Finally, a pilot study of the questionnaire was conducted with ten teachers to test the validity and reliability of the instrument. Practically, the piloting was conducted in the teachers 'offices or teachers room with the presence of the researcher to directly observe the respondents' reactions and answer their questions.

Consequently, the first remark was concerning time; the respondents needed between 20 to 30 minutes to answer the questions. Therefore, the researcher was urged to replace some steps with the move under which they go. For instance, in the **discussion section**, significance of the study goes under evaluation of the study, and the discussion, implication, conclusion were joined together as one option with different possibilities in **the abstract**. The second remark was concerned with terminology, or the words used to express the steps or moves in the last section. Some teachers did not understand some words, so the researcher has replaced them with simpler well known words like: Findings to results, research gap to research weakness, purpose to objective, background information to establishing the topic or introducing the topic. Finally, the option PhD students in the first question has been changed to doctoral students.

3.6.1.3 Data analysis.

After receiving the answers, the analysis were carried using Excel Microsoft Office, the data were translated into tables and graphs; the comment on each question with possible interpretation of the response was provided under the table. Then the discussion of the main findings was detailed in a separate section.

3.6.2 Interview.

Interviews' use is spreading dramatically in Applied Linguistics research especially when aiming at exploring participants' experiences (Talmy, 2010). The aim behind interviewing sciences' teachers at the University of Sétif 1 was:

- Identifying the strategies used in writing
- Exploring the procedure they go through in writing
- Exploring perceptions towards the process of research writing

The interview was designed on the basis of the review on writing for scholarly publication, more specifically strategies in writing for scholarly publication discussed in sections 1.6.1, 1.6.2, and 1.6.3 of the literature review first chapter and adapted questions number one, two, three from a thesis entitled *Investigation into Writing for Scholarly Publication by Novice Scholars: Practices of Canadian Anglophone Doctoral Students* (Habibie, 2015).

The interview is semi- structured composed of 13 open ended questions as Dornyei (2007) explained that a semi- structured is guided by the interviewer ,but the interviewed is given space to elaborate issues. According to Mackey and Gass (2005), the semi-structured interviews can be employed as they "allow researchers to examine phenomena that are not directly observable" (p.137). Using the interview to collect data stems from its flexibility in giving space to the interviewee to express his ideas freely and in details, so the interviewer can draw new questions from the answers. Moreover, it allows collecting data about cognitive operations that the researcher cannot observe like applying different strategies to overcome problems.

After contacting the participants and fixing appointments with them, the interviews took place at the respondents' offices lasting from thirty to fifty minutes. The consent was verbal as the participants showed interest in taking part in the study. The day of the interview, the researcher started by explaining the aim of the interview and the study in general to the interviewee; then, after taking his permission to record, he started by three opening questions to establish the context and build a good relation with the interviewee.

Next, content questions (Croswell, 2007) were raised aiming at investigating the main strategies used to overcome difficulties in writing research; Patton (2002) points out that content questions can be about behaviours and experiences; the questions were predetermined, yet other questions have arisen during the discussion. Finally, the interview ended with one closing question about any remark the respondent is willing to add. A detailed description of each category of questions is provided below:

Section one (question 1 to 3): Difficulties in Writing Research Articles

1. Which part(s) of the publication process do you find challenging and why?

2. When writing for scholarly publication, which section of the article do you find the most challenging and why?

3. When writing for scholarly publication, which section of the article do you find the least challenging and why?

The section was targeted at having a preview about the difficulties the publication procedure may envelop as a whole and the level of challenges and advantages the sciences teachers have when writing the different sections of RAs; meanwhile, the questions help in localizing the area of difficulty and the possible strategies utilized. The section was an opening to next questions and helped in contextualizing the topic of discussion.

Section Two (question 4 to 10): Strategies of Writing Research Articles

4 What are the difficulties do you face when writing a Research article?

5. How do you overcome the challenges?

6. How have you learned how to write for scholarly refereed journals?

7. How did you write the first Research article addressed to a scholarly refereed journal?

8. What are the different stages you went through during writing your research articles?

9. How did you organize the different sections of your articles?

10. Do you refer to other people during writing and why?

The second section provides primary data about the interview aim. It seeks accurate description of writing RAs shedding light on the possible partners that can take part in the operation and the possible strategies that are employed.

Section Three (question 11 to 13): Revisions and Reviewers' Reports

11. What are the main reviewers' reports' comments about?

12. How do you revise the different parts of the research article?

13. Is there anything else you would like to add?

The last section role is identifying the interviewees' difficulties from the reviewers' perspective. It aims at viewing the way sciences teachers see the comments they receive from reviewers and the way they handle them. The interview was conducted using varied languages (Arabic, French, and English) to facilitate the interaction with the interviewees.

3.6.2.1 Participants in the interview.

The interview intent is having a detailed description of the teachers' experiences in writing RAs. The sample is composed of six teachers from different departments in the Faculty of Sciences who volunteered to participate in the interview. For the number of the interviewees, Mackey and Gass (2005) believe that since the aim of qualitative research is not generalizability, a little concern is given to the number of participants. The table below summarises the interview participants' backgrounds:

Table 3.1

The Interview Participants' Background

Participant	Field of study	Number of publications
A	Earth Sciences	29
B	Earth Sciences	3
C	Vegetal Biology	7

D	Agricultural Sciences	26
E	Vegetal Biology	7
F	Animal Physiology	6

3.6.2.2 Pilot study of the interview.

The interview was pilot tested with two teachers from the Departments of Earth Sciences to evaluate the validity of the interview in terms of the questions' appropriateness to the aim and the time needed to accomplish the interview. In terms of validity and clarity, the discussion of the questions showed that the interview questions are clear and lead to the necessary data aimed from the interview. As far as time is concerned, the pilot interviews time did not exceed 50 minutes.

3.6.2.3 Interviews' data analysis.

After interviewing six teachers, the interviews were recorded using a smart phone. In the next step, the data was transcribed by transforming the recordings into a textual format after translating them from French or Arabic to English; transcripts are provided in Appendix (C). Then the researcher carried initial coding(Croswell, 2007) in which she read the passages repeatedly to have a general idea and highlight any attention garbing passages or passages relevant to the study research questions. The coding was done manually because the database does not exceed 500 pages (Creswell, 2011). The researcher labeled the passages to proceed at second level coding (Croswell, 2007). At this level, the researcher went through the different transcripts he has already coded and grouped similar and different codes together and label those higher level codes to form themes. Last but not least, the themes were constringed to six categories. The table below summarises the categories:

Table 3.2

Interview Categories and their Descriptions

Category	Description
Difficulties in writing research	This category presents science teachers discursive and non- discursive problems in writing research
Seeking Assistance from shapers of the research article strategy	It refers to the strategy of seeking assistance from other members of the discourse community or language specialist to shape the research article.
Modeling published texts strategy	It refers to the strategy applied by science teachers in which they follow the structure of published articles, or they borrow expressions from them.
Relying on the mother tongue or the language of instruction strategy	It refers to the strategy in which science teachers write their articles in Arabic or French and translate them to English
Using Technical language strategy	It refers to the use of tables and statistics in order to present information instead of language.
Revisions recommended in the reviewers' reports	It covers the way teachers revise their manuscripts before publication

3.6.3 Document analysis.

Document analysis is defined as the procedure of evaluating or reviewing electronic or printed documents (Bowen, 2009). The word documents covers all of 'advertisements; agendas, attendance registers, and minutes of meetings; manuals; background papers; books and brochures; diaries and journals; event programs (i.e., printed outlines); letters and memoranda; maps and charts; newspapers (clippings/articles); press releases; program proposals, application forms, and summaries; radio and television program scripts; organizational or institutional

reports; survey data; and various public records. , Scrapbooks, and photo albums' (Bowen, 2009, p.27).

In research, document analysis is used along with other qualitative tools for the purpose of triangulation. The documents analysed in the present study are reviewers' reports (Appendices L,M, and N) aiming at identifying the comments concerning the organization of the submitted articles; the reports are taken from the website of *'Science Domain International(SDI)*for articles taken from the website (three (3), five (5), six (6), eight (8), nine (9), ten (10); it is a website that publishes high-quality, open peer-reviewed, open access international journals in various sectors of science, technology and Medicine. The website provides the historical development of published articles in different journals from the first submitted version to the last phase of publication. For other articles (one (1), two (2), four (4), seven (7), eleven (11), twelve (12), thirteen (13), fourteen (14), fifteen (15) our research participants supplied us with the reports as well as the articles. In Earth Sciences, the supervisor provided us with three articles of his candidates. The results of the analysis are going to be summarised and compared with the results of the questionnaire and RAs' move analysis.

The second kind of document to be analysed are RAs submitted to international peer reviewed journals. In selecting the articles, the criteria for the journals' selection are:

- The journal should be international, peer-reviewed, and indexed
- The language of publication should be English
- The field of study should be one of: Biology, Earth Sciences, Agricultural Sciences

The reason behind downloading the articles from the journals in the website (Appendix F) is the difficulty of collecting them from the respondents themselves because they frequently delete any kind of information about their published articles history as soon as they get them published. Subsequently, the choice of the respondents in the interview was led by the articles 'availability. Actually, the website was suggested by a teacher in the Departments of Biology during the process of collecting data, so the researcher downloaded the articles and looked for their writers to interview them. The aim behind analyzing the RAs is to compare the rhetorical structure of the different versions of each RA with the international models used in GA and

identify the deficiencies in the first version in comparison to the last versions as reports often provide details about this part.

3.6.3.1 Description of the documents.

The corpus of the study is composed of fifteen (15) RAs derived from ten (10) different journals in five different disciplines. The links of articles' that are open access (three (3), five (5), six (6), eight (8), nine (9), and ten (10) are in appendix (F), whereas the content of the articles that are not open access is in the appendices (G, H, I, J, K). The common features of the articles are:

- The first main author should be different in each article.
- The articles should have an abstract, introduction, materials and methods, results, discussion/ discussion and results, conclusion sections.
- The first author in the list is responsible for writing the article

As far as reports are concerned, the study deals with twenty (29) reviewers' reports that are divided to two (02) groups. The first group are reports supplied by teachers referring to articles one (1), two (2), four (4), seven (7), eleven (11), twelve (12), thirteen (13), fourteen (14), and fifteen (15), and the second group are reports that are found on the websites with their original manuscripts and final versions. It is worth to mention that article eleven (11) reports were in a form of modifications in red on the original manuscript, and the researcher summarized them to facilitate the analysis. More details are explained in the following table:

Table 3.3

Description of the Articles and Reviewers Reports

N	**Journal**	**Filed**	**N° of authors**	**N° of reviewers reports**	**Publication year**
1	Geotechnical and Geological Engineering	Earth Sciences	3	1 (1A)	2019
2	Geotechnical and Geological Engineering	Earth Sciences	4	2 (2A, 2B)	2019
3	Journal of Pharmaceutical Research International	Biochemistry	7	3 (3A, 3B, 3C)	2018
4	Arabian Journal of GeoSciences	Earth Sciences	9	4 (4A)	2018
5	Annual Research & Review in Biology	Biochemistry	4	4 (5A, 5B, 5C, 5D)	2018
6	Annual Research & Review in Biology	Animal Physiology	4	3 (6A, 6B, 6C)	2017
7	Journal Mining Science	Earth Sciences	3	2 (7A, 7B)	2017
8	European Journal of Medicinal *Plants*	Biochemistry	4	2 (8A, 8B)	2018
9	Advances in Research	Vegetal Biology	3	2 (9A, 9B)	2017

10	Journal of Experimental Agriculture International	Agricultural Sciences	1	2 (10A, 10B)	2017
11	Journal of Mining science	Earth Sciences	4	2 (11A, 11B)	2016
12	Arabian Journal of GeoSciences	Earth Sciences	6	1 (12A)	2016
13	Arabian Journal of GeoSciences	Earth Sciences	5	2 (13A, 13B)	2015
14	Pakistan Veterinary Journal	Agricultural Sciences	5	1 (14A)	2012
15	Journal of Biodiversity and Environmental Sciences (JBES)	Agricultural Sciences	2	1 (15A)	2015

3.6.3.2 Document analysis procedure.

We have two (02) forms of documents to be analysed in this study. The first form is RAs, and the second one is reviewers' reports. The analysis differs between both, yet they share the same objective of displaying the sciences teachers' rhetorical difficulties in writing RAs.

3.6.3.2.1 Reviewers reports.

After skimming the reports, reading involved dividing the texts into codes or text segments that are important utterances or pertinent information related to the research questions aim. The operation of coding was facilitated by the background the researcher has already acquired from writing the review of literature; then themes were derived from segments that were similar to facilitate data interpretation. For article eleven (11) in which the comments were not clearly stated, the researcher extracted the remarks from the modification that were written in red on the original manuscript. Using colored highlighter pens, categories were differentiated; for example, comments related to language refinements were colored in green, and comments

related to the structure of the abstract were colored in yellow. The constricted categories that emerged from the themes are summarised in the following table:

Table 3.4

Categories of the Reports Thematic Analysis

Category	**Description**
Comments about the structure of the abstract	This section deals with the reviewers' comments about the structure of the abstracts
Comments about the structure of the introduction	This section is about the comments addressed to the introduction structure
Comments about the structure of the methodology section	This section covers the reviewers comments, suggestions, and recommendations about the methodology section structure
Comments about the structure of the results and discussion section	This section is mainly about the remarks given to the results, discussion or results and discussion sections concerning the organization of ideas and absence of main elements.
Comments about the structure of the Conclusion	This section covers the reviewers comments about the conclusion structure
Comments about the bibliography section	This section is provided to divergent comments about the bibliography section
Comments about the language of writing	This section covers the remarks about grammatical, spelling mistakes and refinement of language

3.6.3.2.2 Journals' articles.

As far as the RAs analysis is concerned, we opted for qualitative document analysis. First, articles were read to check their division. All the articles share sections' division of: introduction, methods, results, discussion or discussion/results, and conclusion. The next step was identifying the different moves in each section. The move is the unit of analysis in this study; it is defined as a text segment that serves a communicative purpose (Swales, 1990). We have to bear in mind that a move can be realised through one sentence or one or more paragraphs; therefore, moves may differ in length. A move can be accomplished through many steps as well as just one communicative purpose like in the moves of the abstract section. Furthermore, moves can be obligatory or frequently present in the corpus, or they can be optional or less frequent. They can also appear in a cyclical way; i.e., they may reoccur in other parts of the text; in this case, they are considered as part of the same move.

Kanoksilapatham (2007) suggested a method to do move analysis that was followed in this study. First, in order to identify the moves and steps in a particular genre, it is important to have an idea about the overall communicative purpose of the text. In the present study, this was realised through reading the abstract of each RA to have a general idea of the research. The second step is to read sections of the RA and try to identify the function of each segment and its local role in realizing the whole communicative purpose of the section. The operation can be achieved using colored highlighter pens to distinguish purposes from each other. This stage of analysis is the most critical one because it relies on cognitive judgment to identify the communicative purposes of texts and their boundaries; thereupon, extensive readings of the texts should take place.

What facilitated identifying moves and steps is building the analysis on previous studies. In the review of literature, the last part was devoted to presenting models developed by researchers out of moves analysis they carried on RAs in different fields. The researcher attempted to compare between models presenting each section of the RA to come out with frameworks to be applied in the analysis. The last step is grouping similar purposes presented by texts' segments and shares the same overall communicative purposes or move. Labels of steps and moves are derived from models adopted in the analysis. The next section will present those frameworks.

3.6.3.2.3 Analysis Frameworks.

Abstract

Written in one paragraph, the abstract summarises the work and helps the reader in taking the decision about reading the whole work. It covers the following moves:

Move1. Introduction: statement of the topic or establishing the topic of research without referring to previous literature.

Move2. Purpose: the aim of the study should be explicitly stated

Move3. Methods: describing design, procedure, analysis

Move4. Results: announcing major findings

Move5. Conclusion: application, implications, recommendations

Introduction

The introduction plays a vital role in establishing the context of the study by providing backgrounds and providing information about the current work. It is realised through the following moves:

Move 1: Establishing a topic: referring to previous literature, the writer proves that the topic is worth investigation. The writer also attempts to help the reader by putting him in the context of the research.

Reviewing previous Literature: the aim of reviewing literature is providing background of the investigated topic as part of a continuous procedure.

Move 2: Preparing for the present study:

Indicating a gap/raising a question: in this step, the writers seek to highlight a gap in research, investigate an area that was rarely approached

Move 3: Introducing the present study

Step1: Stating Purpose(s): the writer should explicitly state the purpose of his study using appropriate verbs; the corpus analyst uses those verbs as markers of the communicative purpose.

Step2: Describing Procedure(s): the writer describes the procedure of the research operation.

Step3: Presenting Findings:

Step4: Indicating paper structure (present in some fields)

Methods

In this section, operations that are undertaken to achieve the aim of the study are detailed.

Four(04) moves are needed to write it:

Move 1: Describing materials, sample/ subjects/ : the description depends on the material of the study; in Earth Sciences, the material or the subject is an area in a specific region on which the researcher seeks to provide information like the border; however, the subjects or sample in the different fields of biology differs between being an animal or a plant.

Step 1: Listing materials: in this step, the researcher may list the subjects, materials, or sample under analysis; he can use tables or graphs in order to present his materials. For instance, in case of studying a plant weeds, the writer may list the species under evaluation.

Step 2: Detailing the source of the materials: in this step, the researcher explains the way he obtained the materials of the study. In Earth Sciences, they use techniques like imaging to obtain data whereas in other fields they buy the subject (in case of animals) or collect them (in case of plants).

Step 3: Providing the background of the materials: this can be accomplished by providing a detailed description of characteristics and properties of the materials. For instance, in Earth Sciences, they refer to describing the regions' climate and geological structure.

Move 2: Describing experimental procedures

Step 1: Documenting established procedures: the researcher in this step provides support to the methods applied in his research by referring to previous studies or models developed in literature.

Step 2: Detailing procedures: the aim of this step is facilitating replication of the study. The researcher presents details about the experimental procedure applied in his study. For example, in Biology, they explain the procedure they go through in their experiments on animals using plants extracts or medicinal plants. Similarly, in Earth Sciences or Agricultural Sciences, they explain models or techniques used to develop conceptual maps or models about a given phenomenon like slope failure.

Step 3: Providing the background of the procedures: the aim of this step is justifying the choice of the techniques or procedures used in the study; generally, the researchers explain their choices by referring to previous literature and citing the different studies that opted for the same choices and procedures or by referring to explaining the advantages a technique or a model may provide.

Move 3: **Detailing equipment (optional):** in this section, the researcher provides details about the equipments use in the procedure. As a matter of fact, researchers often mention the equipments used but without going into details.

Move 4: Describing statistical procedures: aiming at facilitating replication, researchers are supposed to describe the statistical procedures undertaken in the study. For articles written by researchers in the field of Earth Sciences, we have considered the section entitled "Research Setting" as part of "Materials and Methods section".

Results

The results section offers a detailed report of the study findings. Four (04) moves guide its realization:

Move 1: Restating Methodological Issues: the purpose of this move is to remind the reader of the aim of the study and the procedure of obtaining data. It also prepares the reader for the findings by highlighting vital methodological information.

Step1: Describing aims and purposes: this can be expressed through the use of some verbs like: to examine…, to investigate…

Step2: Stating Research questions: this should be explicitly done

Step3: Making Hypothesis by presenting them

Step4: Listing procedures or methodological techniques: this can be accomplished by referring to techniques, models, methods applied to obtain data like extraction of products or imaging study areas.

Move 2: Justifying methodological issues referring to previous Literature

The main goal of this approach is providing a rational for the researchers' choices of experimental methods or techniques by referring to previous literature to justify soundness and reliability of the methodology adopted in the study.

Move 3: Announcing Results

Step1: Reporting Results: in this step we present the research study findings

Step 2: Substantiating results: the aim is to validate the results; this can be done by referring to similar studies, figures, tables, or comparisons. It persuades the discourse community and assures that the findings are part of "consensual knowledge" (Kanoksilapatham, 2005, 2007)

Step 3: Invalidating Results: presenting data that are invalid, this can be through direct statement or using figures.

Move 4: Commenting Results: it is about presenting the researchers' personal comments.

Step1: Explaining results: by providing explanation like presenting causes of a phenomenon or by interpreting results.

Step 2: Making generalizations or interpretations of the study: this can be by generalizing a given results to a research area like in Earth Sciences, or generalizing results to a metabolism, an organ, etc.

Step 3: Evaluating results

Step 4: Summarizing Results: the summary can be in a form of a statement that starts with an expression indicating the summary like: together, these results…,

Or it can be using tables that summaries all data obtained and facilitates the comparison.

Step 5: Stating Limitations: what we should remember is that the order of moves may change (Kanoksilapatham, 2005).

Discussion

The purpose of the discussion is interpreting the significance of the findings with reference to previous literature. In structuring this section, four (04) moves are needed:

Move 1: Contextualizing the study: it is intended to establish a relation between the study and previous research

Step1: Describing established knowledge: It can be realised through citing or reporting previous research about an approach, a model, or a technique to understand the present one

Step 2: Generalizing, claiming, deducing previous knowledge: it can be realised by describing how findings relate to the results of previous research.

Move 2: Consolidating Results: it aims at shedding light on the strong points in the study and defending its significance.

Step1: Restating methodology (purposes, research questions, hypotheses, and procedures): they should be related to the stated findings; in sections in which the discussion and results are mixed together, we differentiate between restating methodology (purposes, research questions, hypotheses, and procedures) as part of the results or discussion depending on the results that follow it. In the case of the results section, the following results are generally detailed including non significant and invalid results; however, in the case of the discussion section, methodology issues are only concerned with the main findings.

Step2: Stating selected findings: It aims at presenting the most significant findings obtained from the study.

Step3: Referring to previous literature: the goal is the comparison; the researcher in some cases shows the communicative purpose of those steps by using verbs like agree with or disagree with.

Step4: Explaining differences in findings: the researcher explains differences between his findings and findings existing in literature if any.

Step 5: Making overt claims/generalizations: e.g. these results indicate…

Step 6: Exemplifying: by giving examples like figures, images, or maps to prove an idea or a view.

Move 3: Stating limitations of the study: the researcher should explicitly explain the limitations of the study.

Move 4: Suggesting further research: to advocate the need to carry more research to improve the methodology or answer other research questions.

Concerning the results and discussion section, the analysis will be based on the moves. Thus, when applying the models, the division between sections is not considered; what mainly matters is the presence of moves referring to each section. The two sections may share the same moves, yet the move of 'Reporting data when belonging to results section is different from the discussion section. The discussion of results is like a logical story; the writer starts by establishing the context through citing previous research to understand the present one; then he moves to make a claim or a generalization to be proved by selected findings or the main events of the research process; he needs then to compare his results with previous literature to explain similarities and differences. Next, he goes to generalizing the results to the area of his research with providing examples, yet he should not forget to explain the obstacles or limitations of his study to end up with suggesting further research by opting for another methodology or suggesting other aspects to be discovered.

Conclusion

It is intended to explain the significance of the study; it is a synthesis of the study with recommending new research to be covered.

Move 1: Summarizing the study: its objective is reminding the reader of the main stations the research has gone through; generally it includes the aim, main methodological methods, or main results

Move 2: Evaluating the study

Step1: Indicating significance/advantage: it highlights the main realised goal of the work

Step2: Indicating limitations: shedding light on the obstacles encountered during the research process.

Step3: Evaluating methodology: by indicating the effectiveness of the methodology adopted.

Move 3: Deductions from the research: it can be realised through the two following steps:

Step1: Recommending further study: this can be by suggesting improvement in the methodology, investigating other aspects of the phenomenon, or trying the same methodology on another research area or sample.

Step2: Drawing pedagogic implication

When the analysis was accomplished, results of each section were summarised and categorized to facilitate the comparison procedure between the rhetorical structure of the submitted versions and the final published papers. The table bellow details the categories derived from the analysis results of each section. Noticeably, moves that received modifications after the review are generally realised through many steps whereas moves that are not detailed about revision are either realised or not realised in the articles like the case with move two of the methodology section and move four of the results section.

Table 3.5

Categories of the Articles Moves Analysis

The section	**Categories**
Abstract	➢ Abstracts following the standard structure and received no modifications ➢ Abstracts following the model differently, and received no modifications ➢ Abstracts not following the standard structure, and the final version has not been modified ➢ Abstracts not following the standard structure, and the last version received modifications
Introduction	➢ Introductions of move one and move three without modifications after the review procedure ➢ Introduction with three moves without modification after the review

	➢ Introduction with move one and no modification after the review ➢ Introductions with different structures with modifications after the review procedure
Methodology section	➢ Move one without modification after review ➢ Move one with modification after review ➢ Move two: Describing Experimental Procedures with modification after the review ➢ Move three: Detailing Equipments (Optional) ➢ Move four (Describing Statistical Procedures
Results section	➢ Move one: Restating methodological issues without modification after the review ➢ Move one: Restating methodological issues with modification after the review ➢ Move Two: Justifying methodological issues ➢ Move three: Announcing results without modification after the review ➢ Move three: Announcing results with modification after the review ➢ Move Four: Commenting results
Discussion section	➢ Move one: contextualizing the study absence in discussions ➢ Move one: contextualizing the study with modification after the review ➢ Move one: contextualizing the study without modification after the review ➢ Move two: consolidating results added after the review

	➢ Move two: consolidating results without modification after the review ➢ Move two: consolidating results without modification after the review ➢ Move three: Stating limitations of the study ➢ Move four: suggesting further research
The conclusion section	➢ Move one: Summarizing the study ➢ Move two: Evaluating the study is absent ➢ Move two: Evaluating the study with modification after the review ➢ Move two: Evaluating the study without modification after the review ➢ Move three: Deductions from the research is absent ➢ Move three: Deductions from the research with modification after the review ➢ Move three: Deductions from the research without modification after the review

3.6.3.2.3 Pilot coding of the articles.

Kanoksilapatham (2007) suggested that for validating the data obtained from the analysis of RAs, the researcher needs coding rubrics that identify the moves and steps in the analysis. In practice, the coding rubrics are presented in the models already accurately presented. Moreover, he adds that a second coder is needed to validate the data. Actually, it was not possible to find a second coder as the majority of the researcher colleagues are overburdened with the different tasks and their theses preparation. Therefore, the researcher took some measures to achieve a high level of validity of data. The measures are listed below:

- The researcher analysed the same section each time in all the articles to assure the consistency in following the model and more understanding of the sections' structure

- The researcher followed the analysis in articles and books that have tackled the same research area and provided a detailed description of the procedure.
- The articles under analysis were already divided into sections with clear titles which made the analysis procedure more effective.
- The researcher has already the experience of moves analysis as she carried it in his MA dissertation and his research article for graduation.
- The researcher checked the findings of the analysis with reviewers repots to validate the coding results

3.7 Ethical Issues

Ethical issues are generally about the way we treat our data and participants of the study. Starting with participants, during the questionnaire and interviews, the participants were provided with the necessary information about the aim of the study, and the way the data will be used. For the interviews, participant's names were kept anonymous, and the researcher asked for their permission before recording the interviews and provided the necessary information about the data treatment. For the RAs, The researchers that were subject to the interview has provided us with research articles and the rest of the corpus was taken from the website of *Science Domaine international* after having the permission of their authors. Authors' names were kept anonymous along with the titles of the articles.

3.8 Limitations of the Study

The first main limitation lies in the inter-rater reliability. Because the researcher was the only analysts of the RAs, pilot coding have not been achieved. Actually, due to their work loads, we could not find another colleague ready to cooperate. Therefore, the analysis of the corpus as well as the reviewers' reports was conducted by the researcher herself. Moreover, the problem of sampling was raised. The sample for administering the questionnaire was convenient because the participants were unready to help. The researcher was urged to contact a colleague he knows from the Department of Architecture to convince the teachers in the Earth Sciences Departments to answer the questionnaire and accept to be interviewed, and the same went for the Departments of Biology and Agricultural Sciences.

As for the RAs, collecting them was a challenging task for the researcher. In fact, the target population at the beginning was teachers of economics. However, the researcher could not collect articles because teachers are not supposed to write in English. As a matter of fact, articles that are written for the purpose of graduation and promotion are accepted in Arabic to be published in local journals. Consequently, the researcher was obliged to change the population to applied sciences teachers as they are pressed to write in English and publish in international journals. Again the problem was that almost all sciences teachers claim to delete any information related to articles as soon as they get them published which meant spending a year trying to collect a plausible corpus to the criteria of the research. Finally, one of the limitations of our study was that we had a heterogeneous audience consisting of teachers with different number of publications, so they have different levels of difficulty and strategies' use.

3.9 Conclusion

The present chapter attempts to provide a thorough account of the research process; it explains the compliance between the research design and the study aims and research questions. The chapter explains the nature of the study with the rationale behind this choice. It presents the research design, and reports on the discourse community, the sampling procedure, and the research setting. A detailed description of the research tools is also provided.

First, the questionnaire is described with its aim of providing a holistic view of the researchers' awareness about structuring research and the difficulties of accomplishing this activity. Then the interview addressed to six (06) researchers allowed us to identify the strategies adopted to surpass RAs structural organization problems. Finally, document analysis is our basic method of data gathering. It enabled us to confirm the results of the questionnaire and the interview. The chapter also shed light on validity and reliability of data and research tools accompanied with ethical issues concerning data and participants privacy. In the next chapter, we will focus on data analysis; meanwhile, we will bring together issues from the review of literature and methodology chapters. We will also present, interpret, and discuss the results of our research tools to answer the research questions raised earlier.

Chapter Four

Chapter Four: Questionnaire and Interview Findings' Analysis and Discussions

Chapter Four

Questionnaire and Interview Findings' Analysis and Discussions

4.1 Introduction

In the previous chapter, we introduced the research methodology adopted in this study; we have gone through the research design, data collection tools, data collection and analysis procedures, validity, and ethical issues. The present chapter is mainly concerned with presenting results of data analysis. We will first start by presenting data obtained from the questionnaire and the interview. Quantitative data will be presented statistically both in tables and graphs of descriptive statistics, while the qualitative data drawn from the interview questions are presented in main categories.

Then a thorough discussion of results in reference to previous literature will be provided in attempt to answer the first, the second and the third research questions. The choice of presenting the findings of both tools first stems from the logical division of the writing process. We will first start by exploring the sciences' teachers' awareness about the RA rhetorical structure and their perceptions of the difficulties they have in writing each section; then we will move to identifying the strategies they utilize to overcome their rhetorical difficulties to present in the next chapter document analysis findings that confirm or reject the results of this chapter.

4.2 Questionnaire Analysis

Section one: General Information

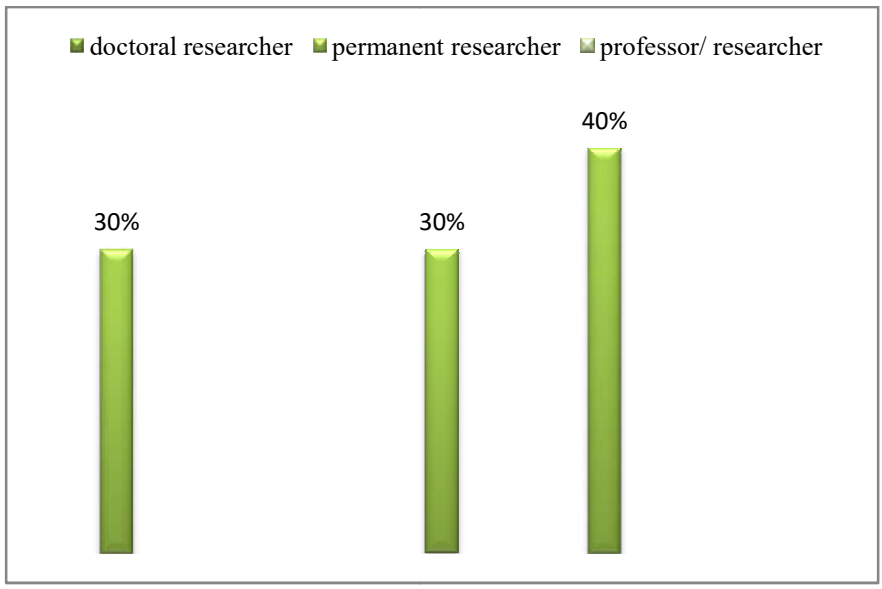
The first section is intended to collect data about the participants and their role as researchers.

Question one: What is your actual role in respect of scientific research?

Table4.1

Researchers' Role in Research

Researchers' Role	N°	%
Doctoral Researcher	6	30%
Permanent Researcher	6	30%
Professor/ Researcher	8	40%
Total	20	100%



Fiigure 4.1 Researchers' Role in Research

The table and the graph (4.1) exhibit the role the participants in the study perform in research. We can see that doctoral researchers present 30% of the population as they have the obligation of publishing at least one research article to graduate. Permanent researchers are generally doctorate holders (30%) that have already publish articles for graduation and trying to publish more articles for the purpose of promotion. At the top of the list come Professor/ Researchers (40%) that are generally main authors of RAs or co- authors in articles of doctoral researchers under their supervision.

Question Two: What is your field of research?

Table 4.2

The Participants' Fields of Research

Field of Research	N°	%
Biology	14	70%
Earth Sciences	2	10%
Agricultural Sciences	4	20%
Total	20	100%

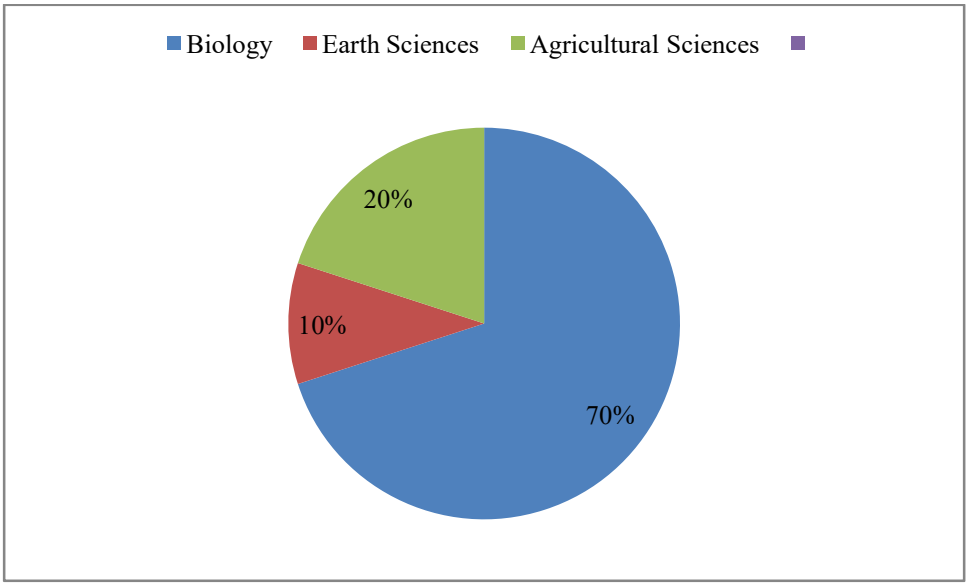


Figure 4.2 The Participants' Fields of Research

The table and the graph (4.2) indicate the different fields of research involved in the present study. In the first place, we can see researchers from Biology with its different five (05) departments namely: Basic Sciences, Ecology and Vegetal biology, Microbiology, Biochemistry, and Animal Physiology. Then in the second place, we have Agricultural Sciences (20%). In fact, many teachers work in the Department of Ecology and Vegetal Biology and Agricultural Sciences as they share some common features. Finally, we have two (02) researchers from the Department of Earth Sciences (10%).

Question Three: How many years of experience do you have in scientific research?

Table4.3

The Participants' Research Experience

Years of experience	**N°**	**%**
0-5	0	0%
6 to 10	7	35%
10 and up	13	65%
Total	20	100%

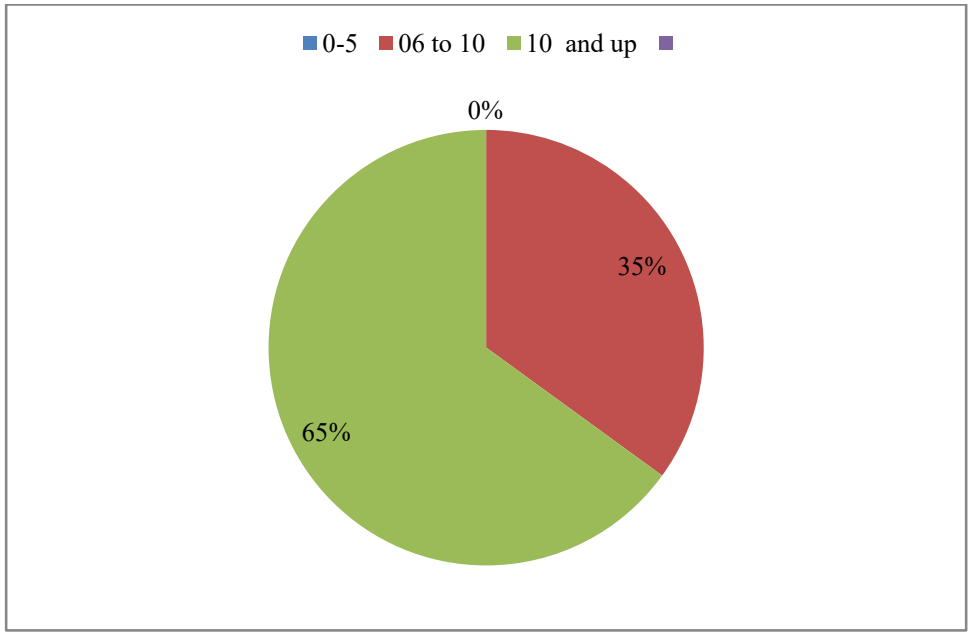


Figure 4.3 The participants 'research experience

The table presents (4.3) the different periods of experience our participants have in research. More than a half (65%) of the participants has ten (10) years and more in research; on the other hand, 35% have an experience of six (6) to ten(10) years. The data proves a kind of maturity our participants have in research.

Section Two: Research writing and English

The aim behind this section is collecting data about the participants' publication experiences, difficulties, and awareness of language and structure importance in writing research.

Question Four: Have you published research articles in English in international, indexed, peer-reviewed journals?

Table4.4

Researchers' Ability to Publication

	N°	%
Yes	20	100%
No	0	0%
Total	20	100%

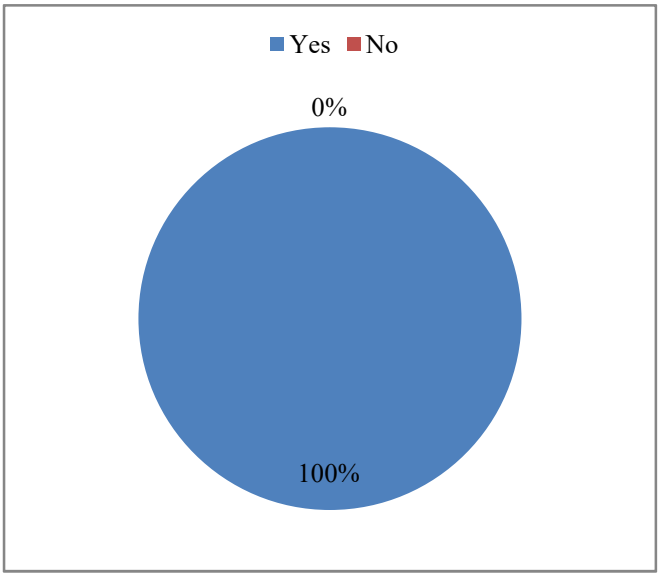


Figure 4.4 Researchers' Ability to Publication

Through the table and the graph, we notice that all the participants have published RAs simply because we looked for researchers who had written for scholarly publication to be able to answer the following questions, or the sampling was purposeful and convenient at the same time.

Question Five: Your Research article (s) was published in journals from:

Class A+

Class A

Class B

Table 4.5

The Researchers 'Journal of Publication Class

Journal Class	N°	%
Class A+	2	10%
Class A	10	50%
Class B	8	40%
Total	20	100%

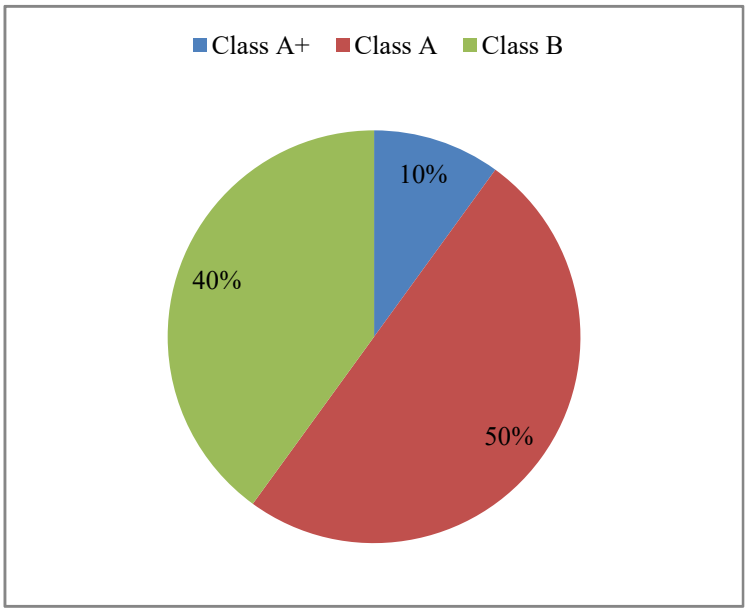


Figure 4.5 The Researchers' Journal of Publication Class

Through the table and the graph, we can understand that the majority of researchers (90%) have published their articles in journals from class A and B that are generally indexed but not all of them have impact factors. They are on the list of the ministry of Higher Education as acknowledged journals for the purpose of graduation or promotion. On the other hand, two (02) researchers (10 %) managed to publish in class A+ due to the high standards of research and language those journals recommend.

Question six: Do you find writing research articles in English difficult?

Table4.6

R*esearch Writing Difficulty*

	N°	**%**
Yes	10	50%
No	10	50%
Total	20	100%

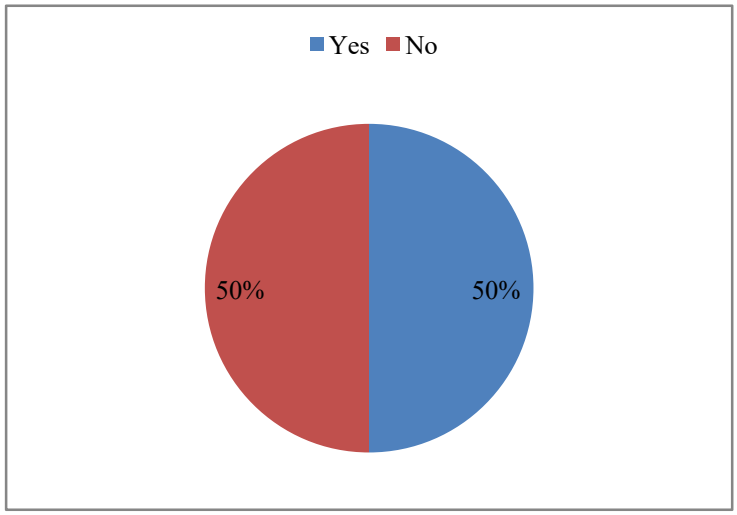


Figure 4.6 Research Writing Difficulty

As shown in table 4.6 half of the participants have difficulties with research writing; they were asked in the following question to explain the problem, while the others showed no problem in writing for scholarly publication. We assume that the results are because researchers are two (02) groups: either experiencing research writing at early stages of research or acquiring it automatically through articles' reading.

Question Seven: If yes, explain your choice; it is difficult because of:

Table *4.7*

Difficulties' Reasons

	N°	%
Academic Vocabulary	6	30%
Writing grammatically correct sentences	5	25%
Flow of information in paragraphs	5	25%
English way of presenting information	5	25%

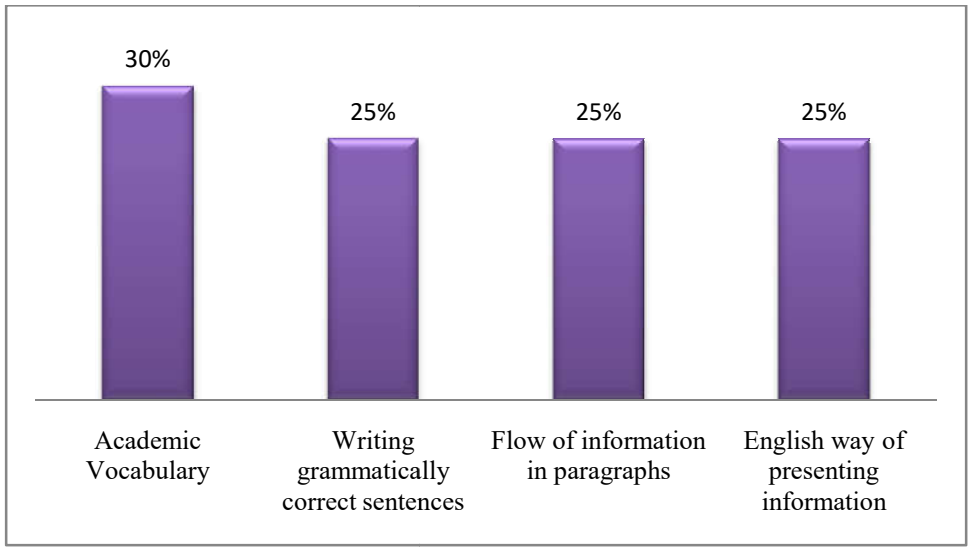


Figure 4.7 Difficulties' Reasons

The participants who expressed difficulty in research writing, they justify this difficulty by referring to many reasons mainly the academic vocabulary (30%) as they are Non native speakers who write for English journals. It is difficult to express your ideas in language that is not your mother language to someone who is supposed to be an expert in the language. They add that grammar, the English language style, and also the structure of research writing (25%) are also among their main problems. To be clear, English is a linear language that has its own characteristics that NNs need to be acquainted with to easily publish their research.

Question eight: Do you believe that the language mastery is highly important in writing research articles?

Table 4.8

The Importance of Language Mastery in Writing Research

	N°	%
Yes	20	100%
No	0	0%

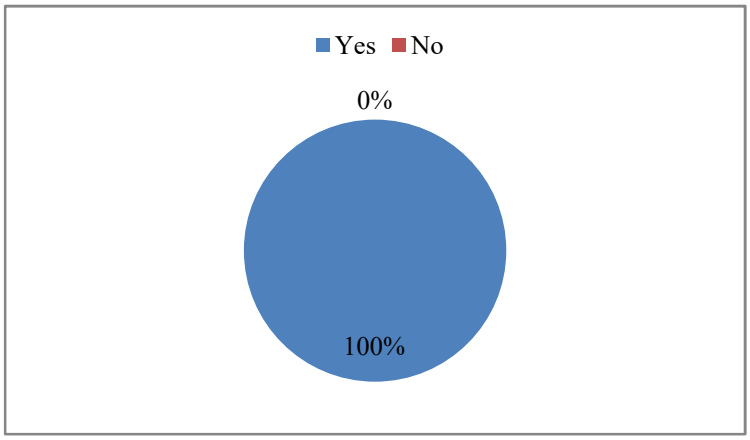


Figure 4.8 The Importance of Language Mastery in Writing Research

All the participants, as the table indicates, agree that the language is an important variable in research writing. This belief is the result of the researchers' experience with writing; many of them got articles rejected by editors due to language problems, and others' articles were subject to several revisions at the language level before getting published which cost them a lot of time and money.

Question nine: If yes, explain your choice; it is important because

Table 4.9

Reasons behind Language Importance in Research Writing

	N°	%
Journals accept articles with high standards of language	17	85%
The writer gains time to invest i in research	9	45%
The writer can present his ideas in clear original way	14	70%

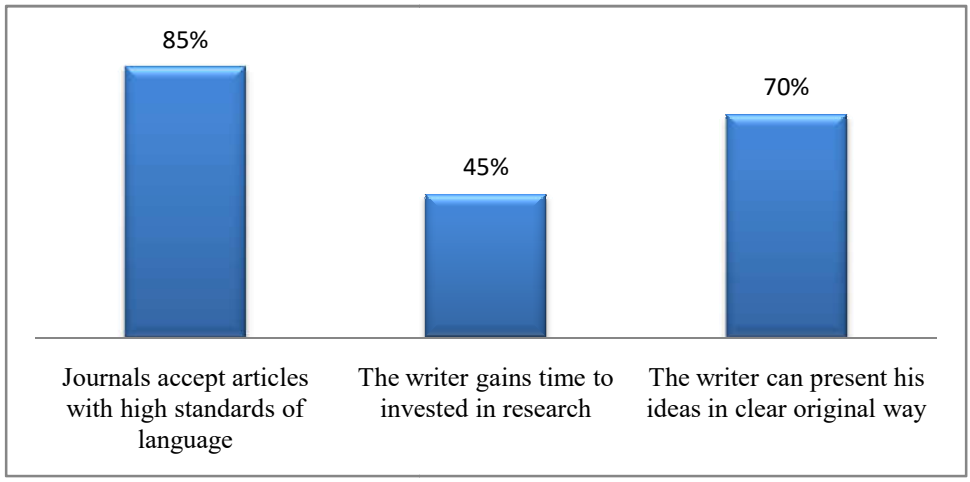


Figure 4.9 The Reasons behind Language Importance in Research Writing

The table and the graph show that the participants' majority (85%) believe that language is important because journals editors and reviewers recommend this in articles. On the other hand, 45% of them think that the mastery of language is time saving, yet 70% of the respondents explain that they need language to present their ideas clearly. All those previously mentioned reasons prove that language mastery is indispensable in research writing.

Question 10: Do you believe that ideas organization is highly important in writing research articles?

Table 4.10

The Importance of Ideas Organization

	N°	%
Yes	20	100%
No	0	0%

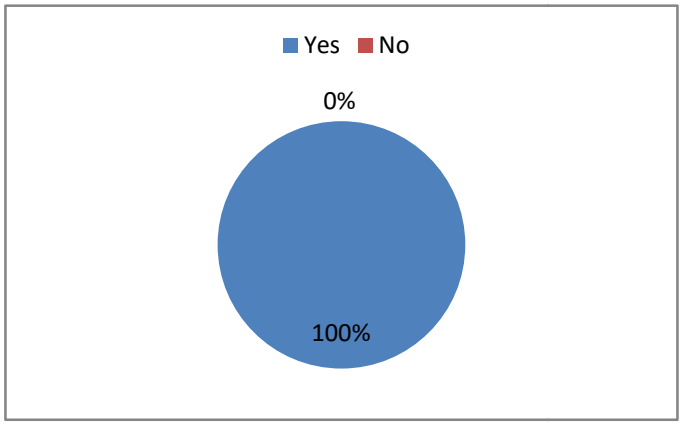


Figure 4.10 The Importance of Ideas Organization

Again all the respondents agree that not only the language is important in writing for research publication purposes, but the ideas should also be organized and well structured because they help in understanding the entire text. The researcher should follow logical order in organizing ideas and be aware of the international conventions governing research writing structure.

Question 11: yes, Explain your choice; it is important because:

Table 4.11

The Reasons behind Ideas Organization Importance in Research Writing

	N°	%
It helps in presenting ideas and understanding them	15	75%
It helps in the organization of the entire text	15	75%
It is the main interest of editors	8	40%

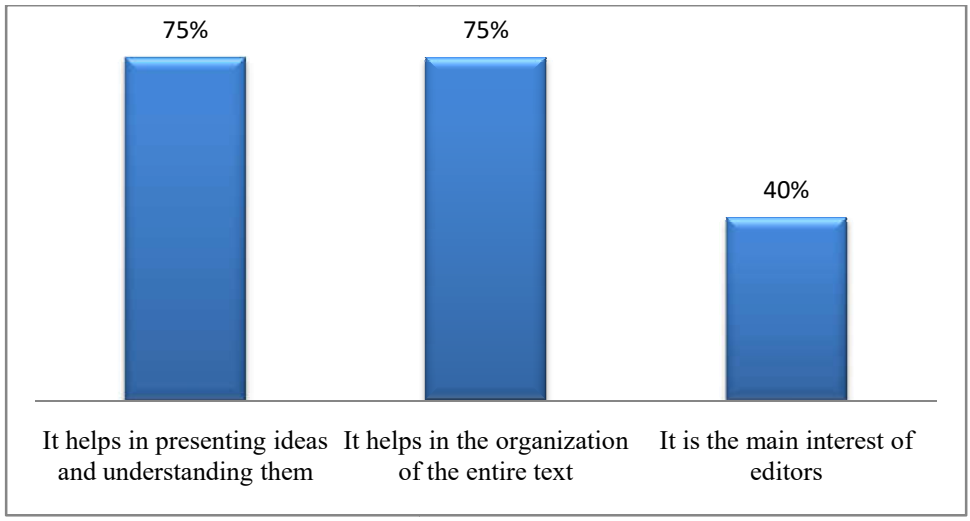


Figure 4.11 The Reasons behind Ideas Organization Importance in Research Writing

Table and graph 4.11 exhibit the researchers' justifications of ideas' organization importance in writing for scholarly publication. The majority (75%) believe that ideas organization is important because it helps in presenting and understanding ideas and the organization of the entire text. The researcher faces difficulty in writing if the ideas and the whole text are not well- structured, and the same goes true for the reader.

Question 12: What are the main difficulties you find in writing research articles in English?

Table 4.12

The Main Difficulties in Writing Research Articles

	N°	%
The language of writing including grammar, vocabulary	12	60
Organization of the research article into sections	2	10
Organization and follow of ideas inside the sections	8	40
Logical and clear arguments	8	40

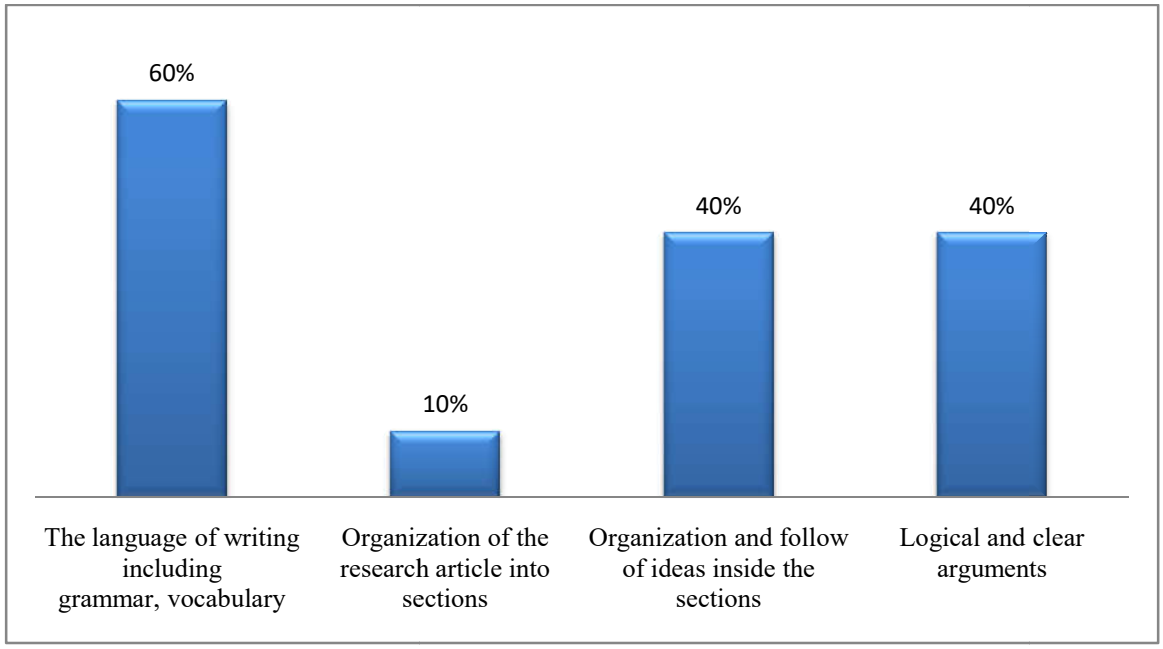


Figure 4.12 The Main Difficulties in Writing Research Articles

We notice in the table and the graph that the most difficult aspect of writing research is the linguistic aspect of language. Twelve (11) participants (60%) responded that they have problems in grammar and vocabulary. Interestingly, the majority do not have problems in organizing RAs into section because reading articles in their field of research helped in raising their consciousness about RAs sectional organization. Meanwhile, eight (8) participants (40%) have problems in clear and logical building of their ideas and arguments inside the articles' different sections.

Question 13: Which step of the publication process do you find challenging?

Table 4.13

The Researchers' Challenging Steps of the Publication Procedure

	N°	%
Writing the first version of the article	16	80%
Revising the articles after receiving the reviewer report	2	10%
Corresponding with the reviewer	4	20%

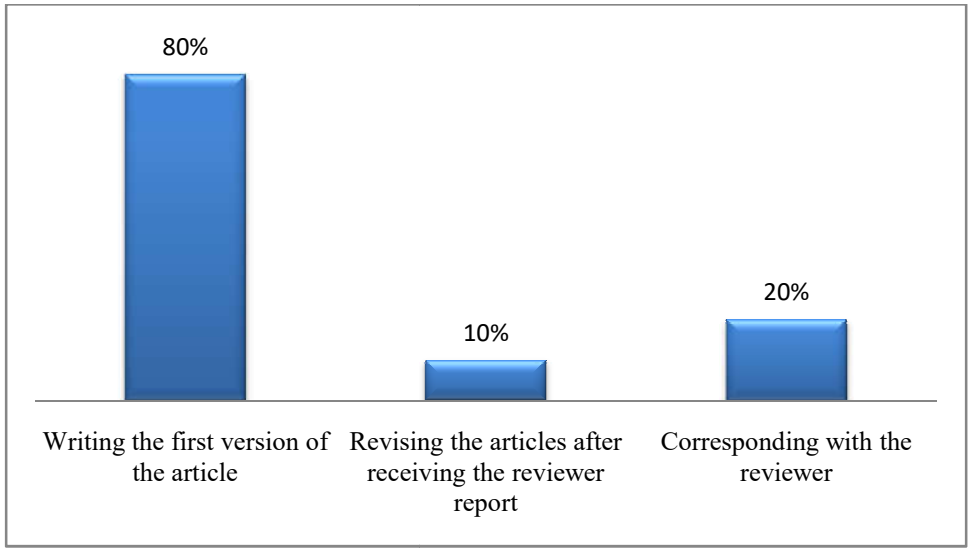


Figure 4.13 The Researchers' Challenging Steps of the Publication Procedure

Apropos to the most challenging step of publication, 80% of the participants agree that the most challenging task is writing the first version of the article; it seems that the researcher, at this stage, is following many tasks simultaneously. Writing the first version covers all of the scientific content of the article, the methodological aspect, and the linguistic and structural aspect. For the step following the submission, few of the respondents (20%) have difficulty in corresponding with reviewers or manuscripts revision (10%).

Question 14: Which section(s) of your academic paper(s) need(s) most revisions based on editors/reviewers' comments?

Table 4.14

Most Revised Sections from Reviewers

	N°	%
Abstract	3	15%
Introduction	6	30%
Methodology section	4	20 %
Results section	6	30%
Discussion section	14	70%
Bibliography	3	15%

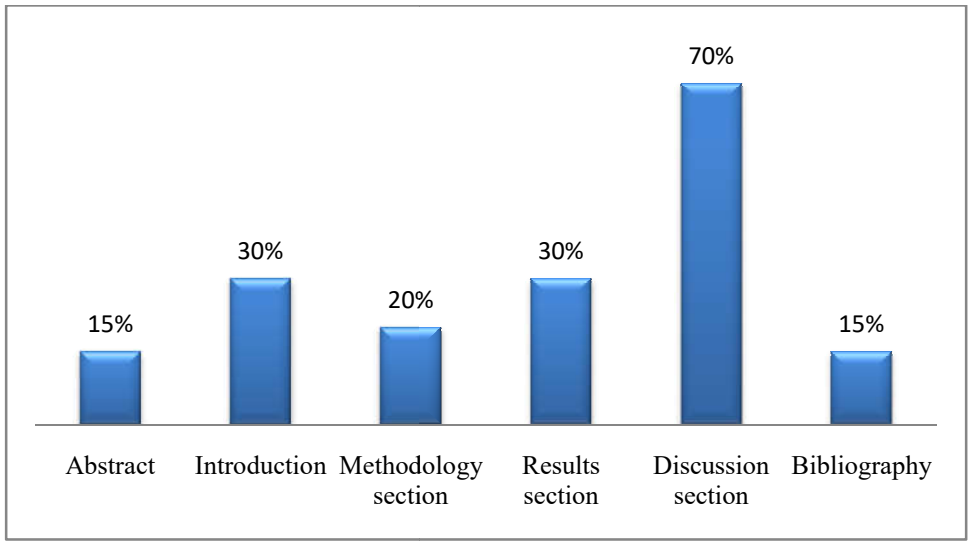


Figure 4.14 Most Revised Sections from Reviewers

As shown in table and the graph 4.14, the discussion section has the highest rate of the revisions shares (70%). We can explain this by the difficulty of writing the discussion section expressed both by researchers and scholars. The discussion is the section where the writer is supposed to explain his findings significance through language which makes it the most important section both for the reviewer and writer. The discussion is then followed by the results and introduction sections (30%). The methodology section comes in the third place with 20 %. Finally, the abstract and bibliography are revised for15% of the participants. As far as the

introduction, results, and methodology sections are concerned, the content is generally extracted from previous research or just reporting results which facilitates the mission of the reviewer and the writer and make them subject to less comments.

Section Three: Articles' rhetorical structure: Awareness and challenges

Section three is designed mainly to assess the respondents' awareness of RAs rhetorical structure along with the difficulty level in realizing each section.

Question 15: Explain how much difficulty you experience in writing the following sections of research articles?

Table 4.15

The Researchers' Degree of Difficulty in Writing Research Articles' Sections

	None	%	A little	%	Quite a lot	%	A lot	%
Abstract	13	65%	5	25%	2	10%	0	0%
Introduction	9	45%	6	30%	3	15%	2	10%
Material and methods	10	50%	7	35%	3	15%	0	0%
Results	7	35%	11	55%	2	10%	0	0%
Discussion	3	15%	6	30%	8	40%	3	15%
Bibliography	14	70%	3	15%	3	15%	0	0%

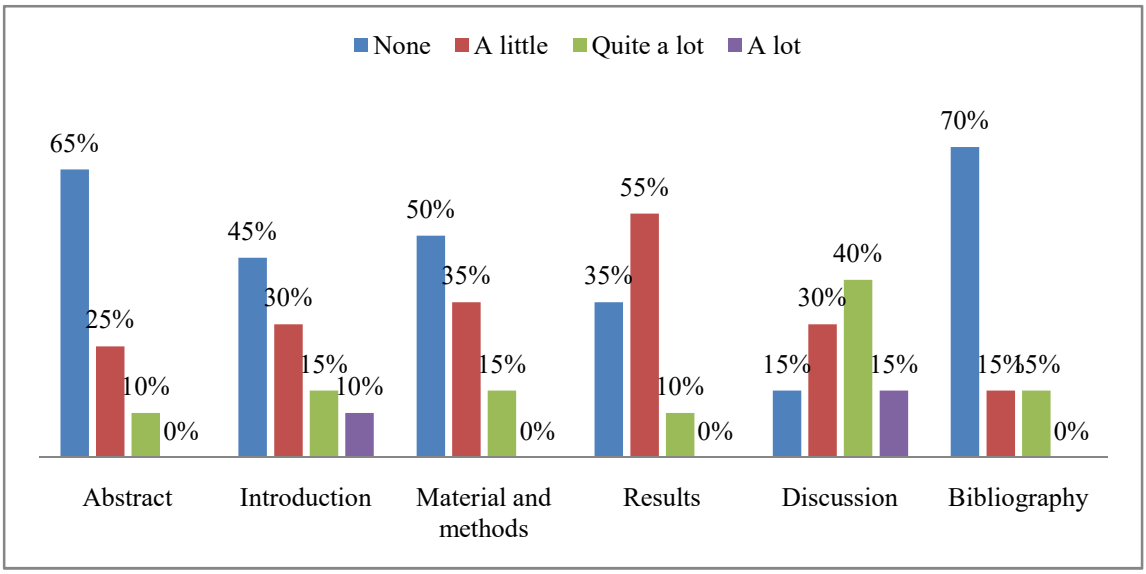


Figure 4.15 The Researchers' Degree of Difficulty in Writing Research Articles' Sections

As revealed in table and graph 4.15, the abstract causes no problem for research writer; they argue that it is the summary of the work; however, 25% of them exhibited a little difficulty in writing the abstract because it is not easy to say the whole work in few words. In the same vein, the introduction does not seem to be problematic for writers for scholarly publication (45% none, 30% a little). The only problem may be the choice of the relevant previous studies to be included in the introduction, or the lack of references about the topic under investigation. Moving to materials and methods section, seven (07) respondents (35%) expressed little difficulty in writing the section, while half of them (50%) displayed no difficulty as they refer in this section to summarizing the operation and experiments of their studies in words that are in most cases technical.

For results section, Eleven(11) participants (55%) showed little difficulty in writing this section due to the large amount of data that can be obtained and the trouble of selecting what is to be included and what to be excluded, and the way the data reporting is to be structured. Next, the discussion section presents quite a lot difficulty for 40% of the participants, and a little difficult for 30% of them, while just 15% of the participants expressed no difficulty and 15% showed having a lot of difficulty. We can understand the importance of the section both for the writer and the reader of the articles, and how this section represents the researcher personal touch in the article as a whole. Finally, the bibliography seem to be no trouble for 70% of research writers, yet 30% of the participants are equally divided between quite a lot and a little because they find problems in adapting the bibliography to different journals guidelines.

Question 16: When writing an abstract, what elements do you include?

Table 4.16

Elements Included in the Abstract

	N°	%
Establishing the topic (Introduction)	13	65%
Review of Literature	1	5%
Research Questions	11	55%
Statement of the purpose	13	65%
Description of methodology	11	55%
Announcement of results	19	95%

Discussion	1	5%
Conclusion	13	65%
Implications	3	15%

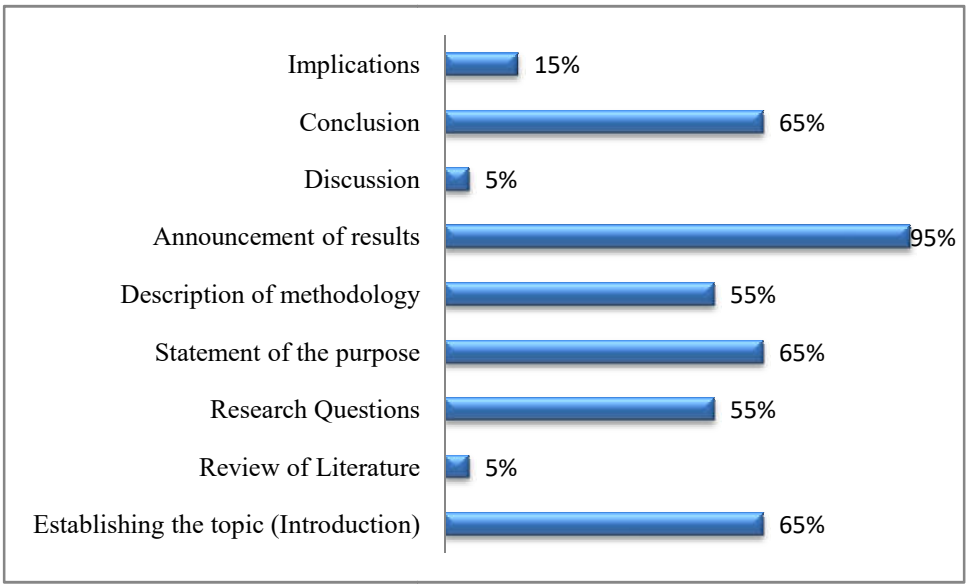


Figure 4.16 Elements Included in the Abstract

As can be read in table 4.16, we notice that announcement of results is included by almost all participants in their articles abstracts because the abstract is the part for showing the researcher contribution, and results are the most important part of the research. Next, Thirteen (13) participants (65%) agreed on including all of the introduction to the topic because the writer needs to pave the way for the reader and contextualize his study; statement of the purpose because we have to designate a purpose for each step we carry in research, and conclusion to come out with the main results obtained from the research. Then, we can see that eleven (11) respondents share the point of view of including research questions and methodology description in the abstract; this can be explained by the difference that may occur between the different disciplines or the guidelines imposed by journals. Finally, few researchers included the implications (15%) and review of literature (5%) as they represent the detailed content of the RA.

Question 17: Explain how much difficulty you experience in writing the following elements of the abstract.

Table 4.17

The Researchers' Degree of Difficulty in Writing the Abstract Elements

	None	%	A little	%	Quite a lot	%	A lot	%
Topic establishment	13	65%	5	25%	1	5%	1	5%
Statement of the purpose	10	50%	8	40%	2	10%	0	0%
Methodology description	13	65%	6	30%	1	5%	0	0%
Results Announcement	8	40%	10	50%	2	10%	0	0%
Discussion, implication, conclusion	6	30%	7	35%	6	30%	1	5%

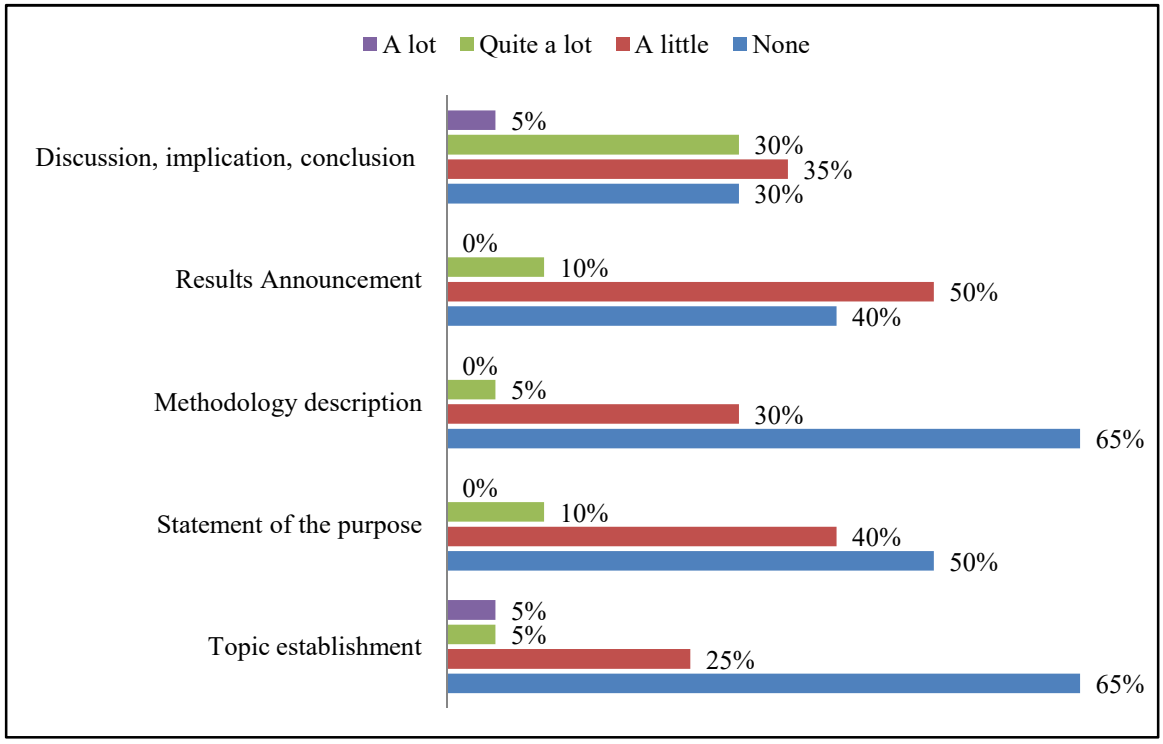


Figure 4.17 The Researchers' Degree of Difficulty in Writing the Abstract Elements

Table and graph 4.17 demonstrate no difficulty (65%) or little difficulty (25%) in topic establishment. Similarly ten (10) participants(50%) expressed no difficulty in writing the purpose of the study, yet the difficulty starts getting higher (a little 40%) and quite a lot (10%) because the whole study needs to be summarised in one purpose written in few words. For the third move, methodology description, the majority (65%) claimed to have no difficulty in writing this section and less than a half (30%) claimed to have a little difficulty because the methodology is already prepared in a separate section, so they need just to summarize it.

In announcing results, ten (10) participants (50%) announced that they have a little difficulty in writing this move while 40% have no difficulty in writing it. We can understand that this move is different from other moves as the researcher needs to select the significant results to be presented in the abstract and not summarize the whole results. The last move in the abstract is writing the conclusion, implications, or discussion; the participants expressed almost equal rates (None 30%, A little 35%, Quite a lot 30%) that can be explained by a difficulty in writing this move because it represents the fruit of the undertaken study.

Question18. When writing an introduction, what elements do you include?

Table 4.18

Elements Included in the Introduction

	N°	%
Stating research purpose	19	95%
Reviewing previous research	18	90%
Focusing on a weakness in previous research	14	70%
Raising a question	13	65%
Describing the research procedure	6	30%
Presenting results	2	10%
Indicating paper structure	3	15%
Detailing the source of materials	2	10%
Stating limitations	2	10%

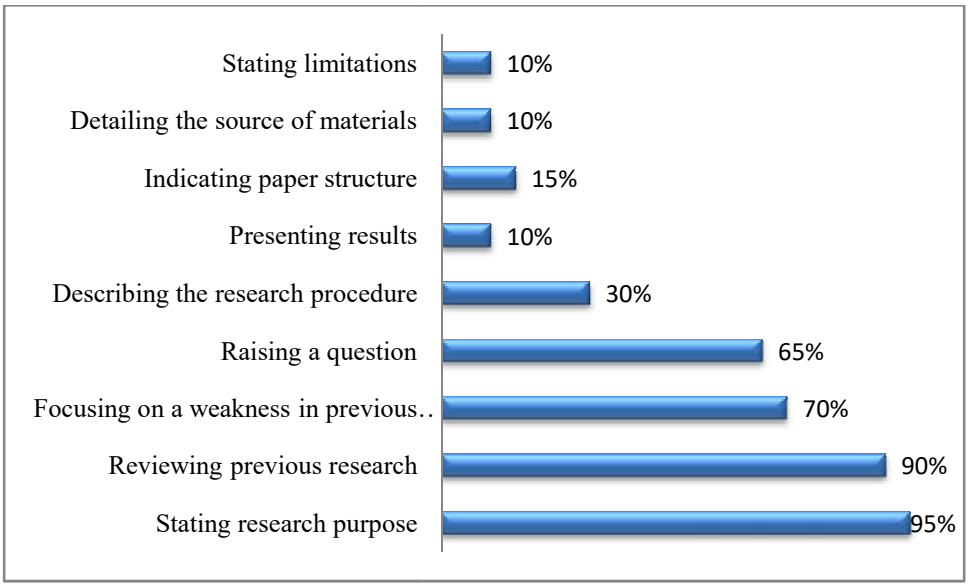


Figure 4.18 Elements Included in the Introduction

The participants highly agreed on including some moves in the introductions of their articles like (stating research purpose95%), (Reviewing previous Research 90%), (Focusing on a weakness in previous research 70%), (Raising a question, 65%) which reflects the role of the introduction that aims at putting the reader in the research context, introducing him to the background of the study, the gap in previous research the study will bridge, and the aim of the study. On the other hand, the participant almost agreed on not including the research procedure 30%, presenting results 10%, indicating paper structure15%, detailing the source of materials 10%, and stating limitations10%. It seems that the participants consider those elements as details of the work that should not be placed in the introduction or the nature of the field does not recommend mentioning such details.

Question 19: Explain how much difficulty you experience in writing the following elements of the introduction:

Table 4.19

The Researchers' Degree of Difficulty in Writing the Introduction Elements

	None	%	A little	%	Quite a lot	%	A lot	%
Stating research topic	11	55%	6	30%	2	10%	1	5%
Reviewing previous Research	7	35%	8	40%	3	15%	2	10%
Indicating a weakness in previous research	6	30%	6	30%	7	35%	1	5%
Raising a question about previous research	7	35%	10	50%	3	15%	0	0%
Stating the purpose of the study	8	40%	8	40%	1	5%	3	15%
Describing research Procedure	11	55%	5	25%	2	10%	2	10%
Presenting research questions or hypothesis	5	25%	10	50%	4	20%	1	5%
Presenting findings	11	55%	9	45%	0	0%	0	0%
Indicating Paper Structure	11	55%	6	30%	2	10%	1	5%

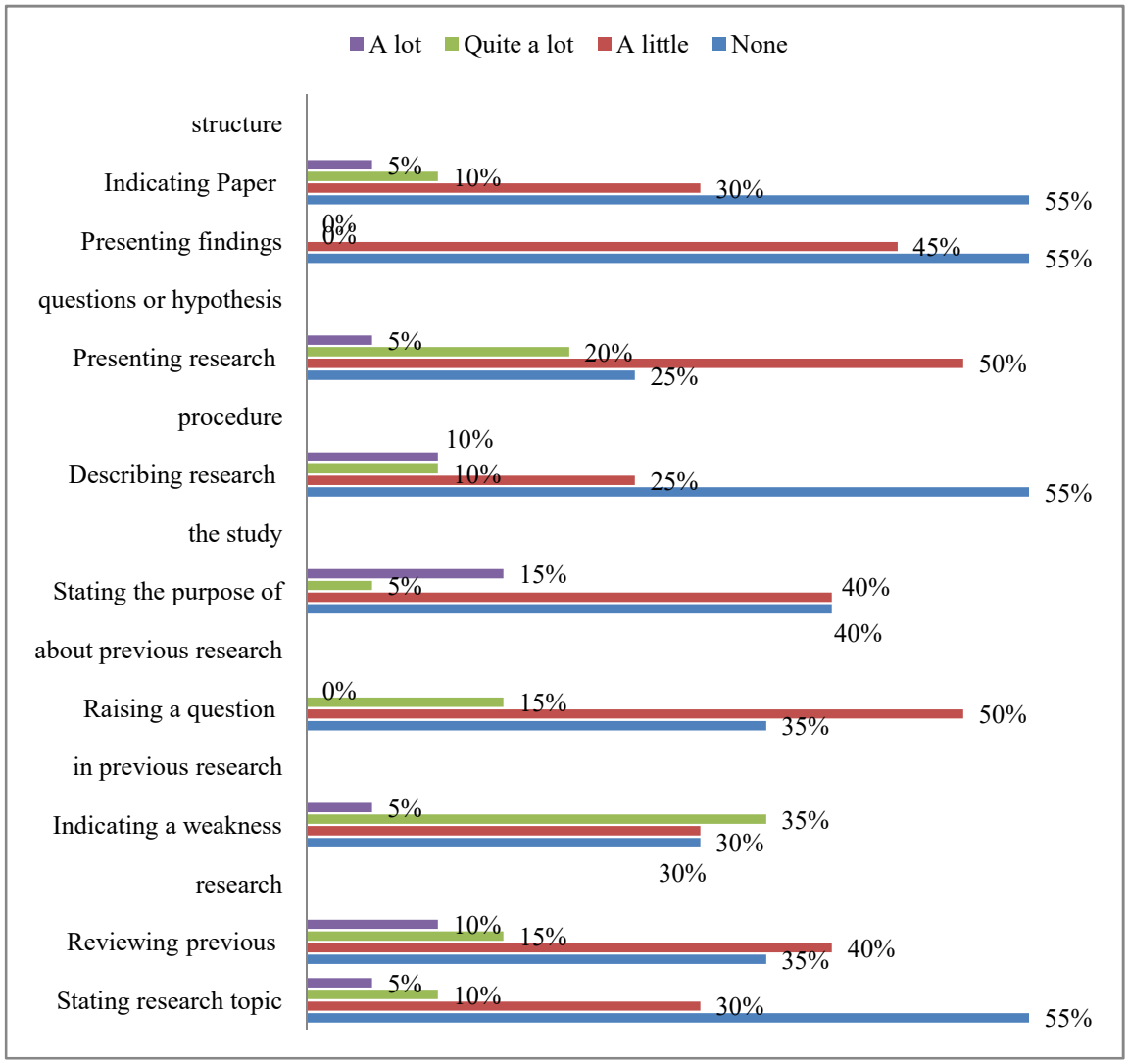


Figure 4.19 The Researchers' Degree of Difficulty in Writing the Introduction Elements

We start by the most frequently chosen elements in the previous question; the participants claimed that they have no difficulty in stating the topic of the study (55%), yet 30% of them have little difficulty. The second communicative purpose the participants stressed is reviewing literature; the table and the graph show that 40% of the participants have a little difficulty and 35% have no difficulty reviewing the literature because the only problem they may encounter in this section is the lack of references or the choice of references to be included. Third, the table and the graph demonstrate interesting results in terms of the third move; the teachers (35%) stated that they have quite a lot difficulty in indicating a weakness in previous research; other teachers (30%) explained that they have slight difficulty (a little) while 30% of them expressed no difficulty. Then 50% of the respondents indicated that they have little difficulty in raising a

question about previous research, and others (35%) have no difficulty in realizing this move. This suggests that the difficulty may lie in being able to identify the aim of the study and what other studies missed to cover in order to be able to identify the research gap and raise questions about it.

In stating the purpose of the study, the same number of participants shared the view of having a little difficulty (40%) or not having any difficulty while 15% declared to have a lot of difficulty as identifying and clearly stating the purpose of the study is one of the vital steps in carrying a research study. Moving to less frequently used moves or steps in the introduction, the participants in the study (55%) have no difficulty and 25% have a little difficulty in describing research procedures. For presenting research questions, five (05) participants (25%) have no difficulty while half of them has little difficulty(50%), and 20% have quite a lot difficulty in presenting the hypothesis or the research questions the study is trying to answer. Moving to presenting findings the participants are divided between having no difficulty (45%) and a little difficulty (55%). Finally, indicating paper structure seems to present no problem for 55% of the respondents and little difficulty for 35% of them. We notice that the rates are similar in number and choice (none or a little); we may explain this by having a quick look at the results of the previous question; just few of the respondents indicated that they include those elements in their introductions (between 10% to 15%), so when it comes to the degree of difficulty, they decided to choose none or little.

Question 20: When writing methodology section, what elements do you include?

Table 4.20

Elements Included in the Methodology Section

	N°	%
Describing materials used in the research	17	85%
Describing the experimental procedure	19	95%
Giving details about the equipments used in the research	13	65%
Describing statistical procedures	16	80%
Stating limitations	5	25%
Summarizing results	1	5%

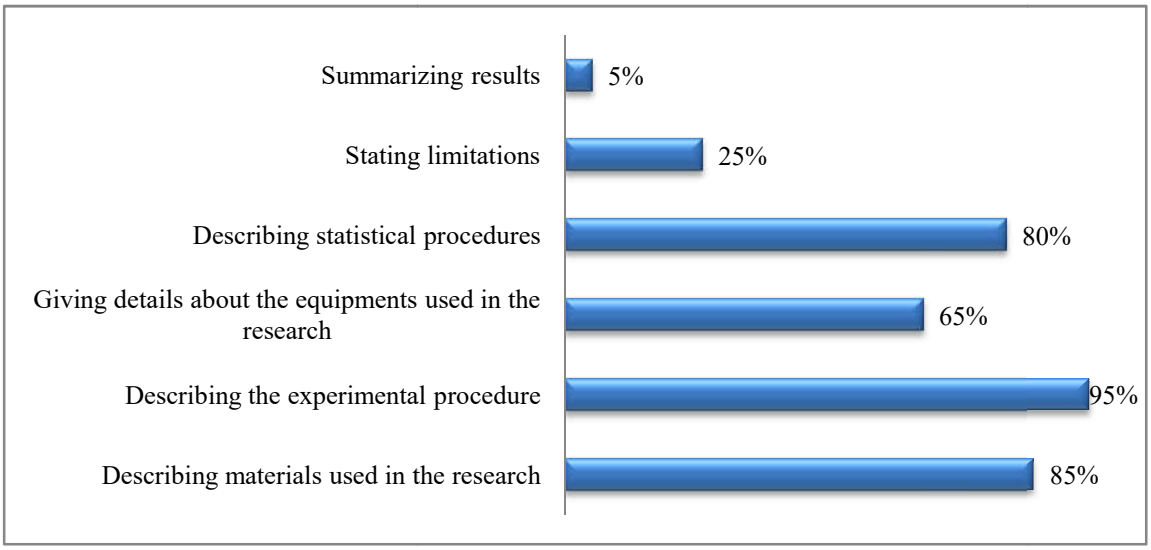


Figure 4.20 Elements Included in the Methodology Section

As displayed in table and graph 4.20, the participants highly agreed on including all the first four moves (describing materials 85%, describing experimental procedures 95%, Giving details about equipments 65%, and Describing statistical procedures 80%). The choice of those moves goes back to the nature of the fields subject to analysis. Biology, Agricultural Sciences, and Earth Sciences are known for their experimental nature in which the research needs to mention all those details to the reader to open the door for research replication. On the other side, the researchers in our study seem to agree on not including both limitations of the study(25%) except for those may be who choose to include the limitations of the research methodology like lack of products or equipments. Lastly, summary of the results (5%) as it is considered as part of the next sections.

Question21. Explain how much difficulty you experience in writing the following elements of the methodology section

Table 4.21

The Researchers' Degree of Difficulty in Including Methodology Section Elements

	None	%	A little	%	Quite a lot	%	A lot	%
Describing materials used in the research	15	75%	4	20%	1	5%	0	0%
Describing experimental procedures	9	45%	9	45%	2	10%	0	0%
Giving details about the equipments used in the research	14	70%	5	25%	1	5%	0	0%
Describing statistical procedures	9	45%	4	20%	6	30%	1	5%

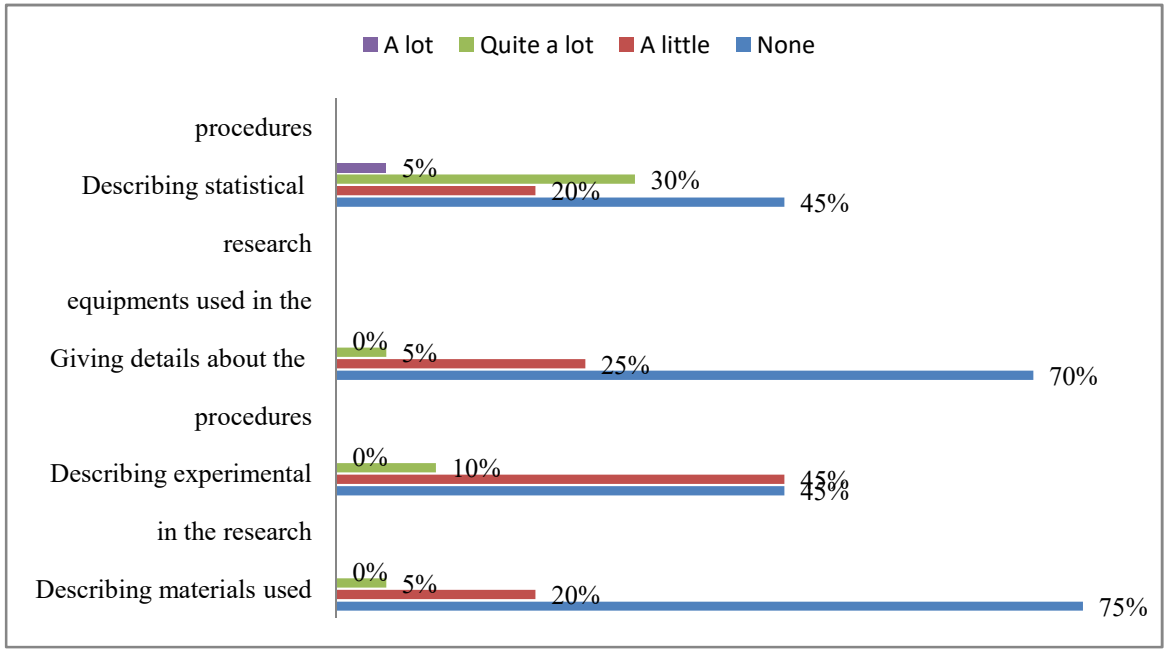


Figure 4.21 The Researchers 'Degree of Difficulty in Including Methodology Section Elements

In the methodology section, as the table and the graph display, the majority of participants(75%) do not have problems in describing the materials used in research ,and less than the half (20%) have a little difficulty. Similarly, 90% of the respondents are divided between having no or little difficulty in describing experimental procedures. Moreover, 70% of

our participants expressed no difficulty or 25% a little difficulty in giving details about the equipment used in the research. This can be explained by quality of information they use; they tend just to describe what is present as materials in the study. Interestingly, in the last move, the rates tend to differ as 45% of the participants have no difficulty in describing the statistical procedures ; 20% have a little difficulty, and 30% have quite a lot difficulty. The difficulty may lie in the choice of the procedures to be described in the study and the way to be described.

Question22. When writing results section, what elements do you include?

Table4.22

Elements Included in the Results Section

	N°	%
Announcing results	20	100%
Consolidating results	16	80%
Suggesting further research	6	30%
Restating the purpose, research question, Hypothesis	4	20%
Commenting results	14	70%
Stating limitations	4	20%
Evaluating results	16	80%

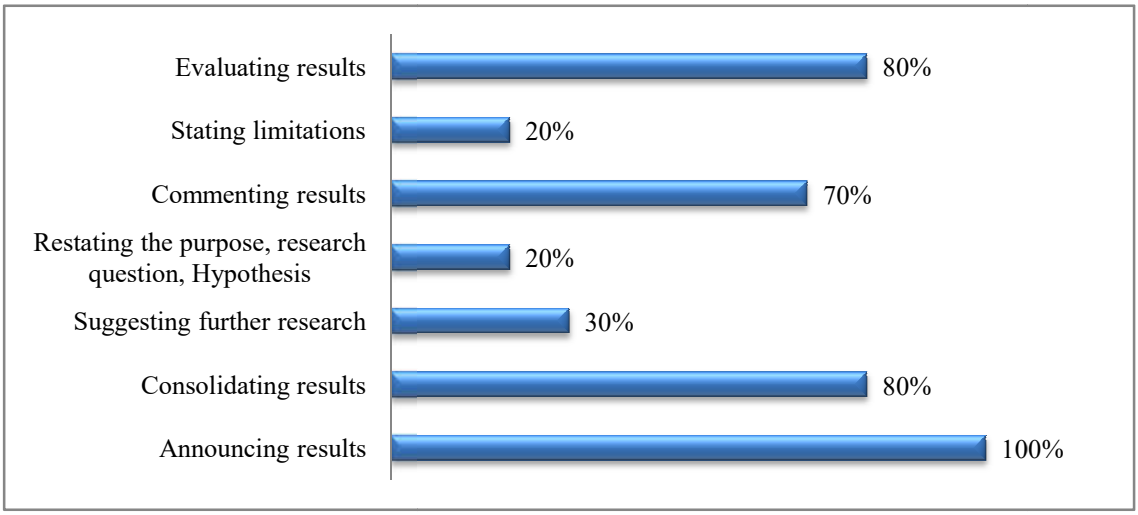


Figure 4.22 Elements Included in the Results Section

The table and the graph show that all the participants (100%) included announcing results move in the results section as it is the most significant move in this section; they tended also to agree (80%) on consolidating results in this section. Furthermore, the participants indicated that they comment results (70%) when writing the results section in RAs, and they evaluate them. The justification of the inclusion of those moves may lie in the objective of the section as the name suggests; it is called the results section which may lead the writers to think of including all what is related to results. On the other hand, 20% of the participants chose to tick the limitations of the study and restating methodological issues like the purpose, research questions, and hypothesis because they do not belong to this section as the aim recommends.

Question23. Explain how much difficulty you experience in writing the following elements of the results section

Table 4.23

The Researchers' Degree of Difficulty in Including the Results Section Elements

	None	%	A little	%	Quite a lot	%	A lot	%
Announcing results	13	65%	4	20%	3	15%	0	0%
Restating the purpose ,	11	55%	7	35%	2	10%	0	0%
Commenting results	3	15%	7	35%	8	40%	2	10%

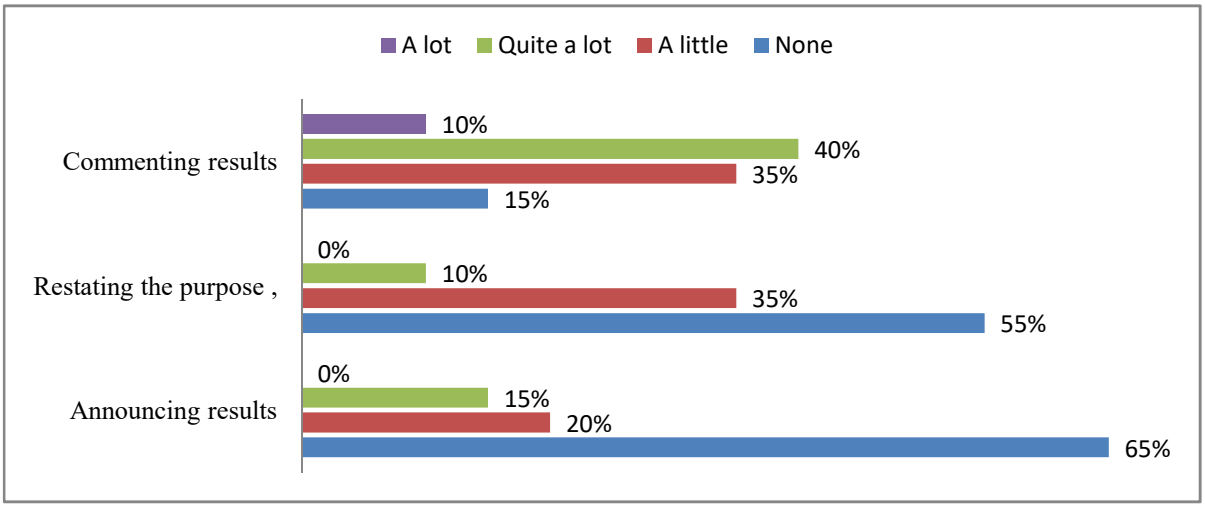


*Figure 4.23*The Degree of Difficulty in Including the Results Section Elements

Writing the results section needs including three (03) main moves in which the writers for scholarly publication level of difficulty differs. In announcing results, the participants (65%) answered by declaring no difficulty while 20% claimed having a little difficulty. In the Second move, the respondents (55%) answered by choosing the first option (none) and 35% chose the option of" a little difficulty". In the third move, the statistical analysis showed a different view; the respondents in this move seemed to have quite a lot of difficulty (40%) in commenting and interpreting data, 10% displayed that they have a lot of difficulty. On the other hand, 35% of the participants have a little difficulty while the rest (15%) have no difficulty in writing this move. This suggests that this move may be different from the other moves. In the previous two (02) moves, the writer just reports or restates data that are already at his hand, yet in the last move, he needs to explain the data and interpret it which generally depends on the understanding of his work and previous research.

Question 24: When writing the discussion section, what elements do you include?

Table 4.24

Elements Included in the Discussion Section

	N°	**%**
Report previous research to understand the present one and describe the relation between them	19	95%
Restate methodology issues	3	15%
State selected findings	14	70%
Compare the research results with results of the previous studies	17	85%
Explain differences in findings	18	90%
Make generalization from the results	14	70%
State limitations and suggest further research	10	50%
Report results	5	25%

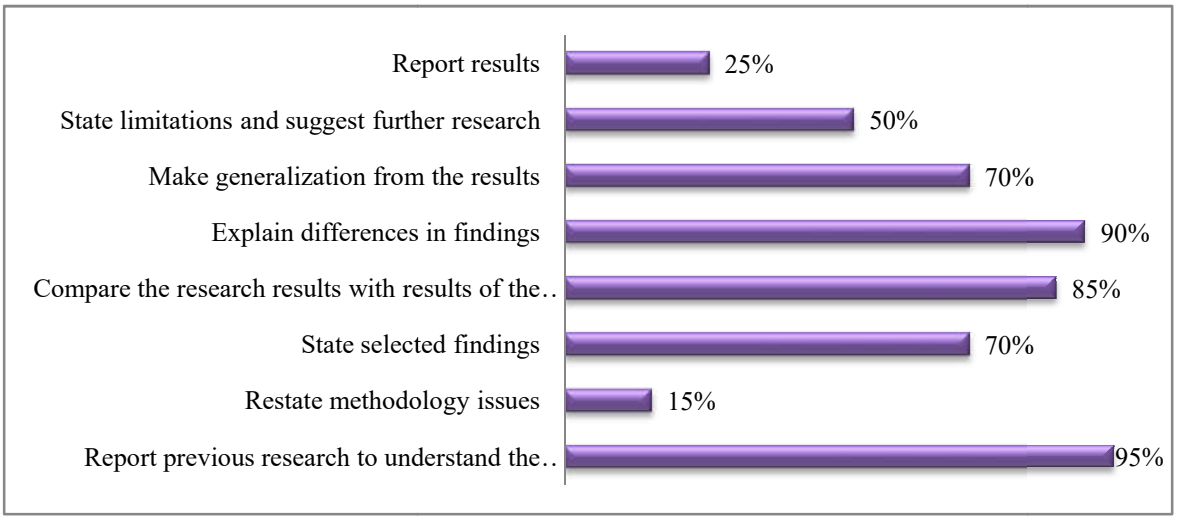


*Figure 4.24*Elements Included in the Discussion Section

The table and the graph 4.24 reveal that he main elements the respondents agreed to include in the discussion section are: reporting previous research to understand the present one and describe the relation between them (95%), comparing the results with results of previous studies (85%), explaining differences in findings (90%), stating selected findings (70%), and making generalizations from the study (70%); this may be justified by the aim of the discussion section. In this section, the writer is supposed to present the most important findings to prove the significance of his results and its reliability in comparison to other studies. The second group of elements was chosen by few researchers: restate methodology issues (15%), reporting results (25%). These rates suggest that researchers probably consider those elements as irrelevant to the discussion. Finally, the move of stating limitations and suggesting further research seem to be chosen by half of the respondents; this may be explained by the difference between varied fields or journals regulations.

Question 25: Explain how much difficulty you experience in writing the following elements of the discussion section

Table 4.25

The Researchers' Degree of Difficulty in Including the Elements of the Discussion Section

	None	%	A little	%	Quite a lot	%	A lot	%
Reporting previous research to understand the previous one and describe the relation between them	3	15%	12	60%	5	25%	0	0%
Restating methodological issues	11	55%	8	40%	1	5%	0	0%
Stating selected findings	7	35%	11	55%	2	10%	0	0%
Comparing the research results with results of previous studies	5	25%	12	60%	3	15%	0	0%
Explaining differences in findings	7	35%	6	30%	7	35%	0	0%
Making generalizations from the results	6	30%	9	45%	4	20%	1	5%
Stating limitations and suggesting further research	9	45%	8	40%	3	15%	0	0%

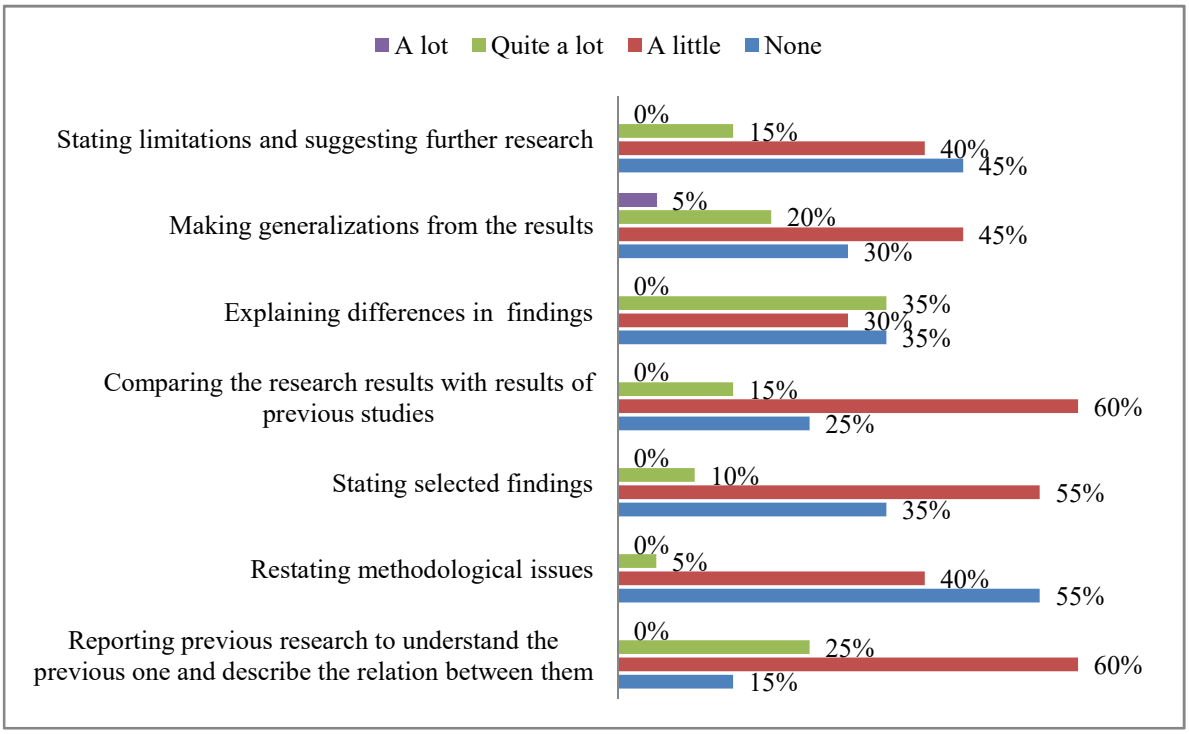


*Figure 4.25*The Researchers' Degree of Difficulty in Including the Elements of the Discussion Section

With regard to the level of difficulty in writing the different moves of the discussion section, the respondents (60%) indicated that they have a little difficulty in reporting previous research to understand the previous one and describe the relation between them, others (25%) declared having quite a lot of difficulty, whereas 15% of them do not have any problems any fulfilling this communicative purpose. The statistics revealed that the level of difficulty may be little because the respondents' only problem is choosing or finding the references. For the second move, restating methodological issues, respondents were divided between having no difficulty (55%), a little difficulty (40%), and quite a lot difficulty (5%). The reason behind the answer may be the choice of the majority to not include this move in their discussions.

Thirdly, the graph and the table display that 55% of the respondents have a little difficulty in stating selected findings, and 35% of them have no difficulty while the rest (10%) have quite a lot of difficulty. Similarly, the fourth move of comparing the research results with results of previous studies presents a little challenge for the respondents (60%) or no challenge for (25%) of them, and 15% of the participants have quite a lot of difficulty. Differently, Move five (05) of explaining differences in findings suggests another vision; 35% of the respondents

have no difficulty; 30% have a little difficulty, and 35% have quite a lot of difficulty. Finally, the last two (02) moves of making generalization from the research and stating limitations and suggesting further research seem to be no problem for the respondents as None is chose by 40% and 45% ; little difficult is 30% and 45%, and the rest are quite a lot 20% and 15%.

Question 26: When writing the conclusion section, what elements do you include?

Table 4.26

Elements Included in the Conclusion

	N°	%
Summarizing the study	14	70%
Presenting statistics	9	45%
Evaluating the study	18	90%
Indicating limitations	12	60%
Drawing implications	15	75%
Suggesting further research	16	80%

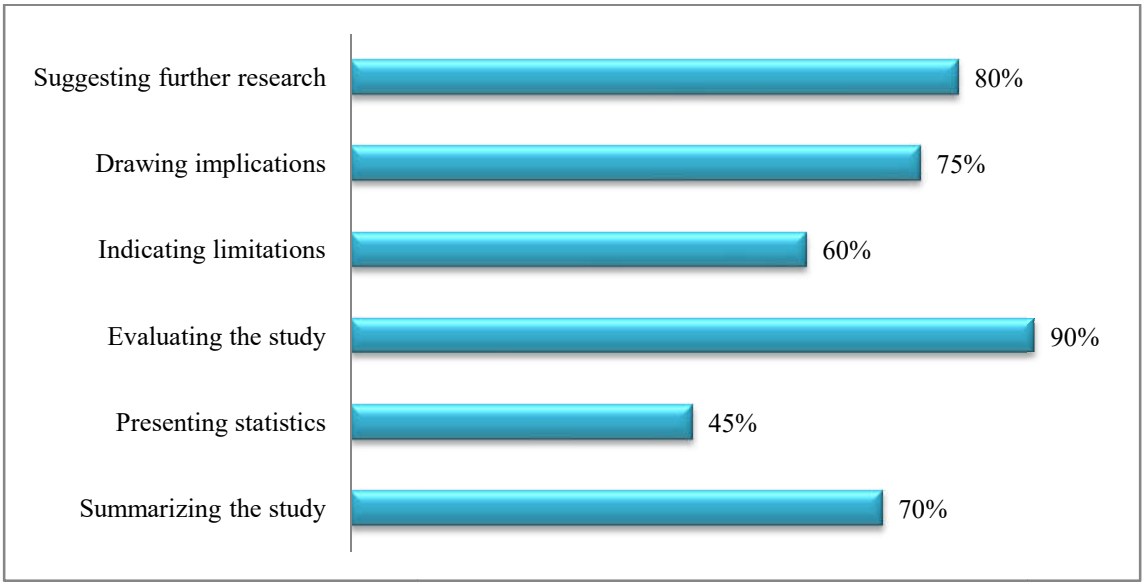


*Figure 4.26*Elements Included in the Conclusion

As displayed in table and graph 4.26, the participant considered summarizing the study (70%), evaluating the study (90%), indicating limitations(60%), drawing implications (75%), and suggesting further research as vital moves in the conclusion, yet 45% of them considered presenting statistics less relevant to the conclusion section.

Question 27: Explain how much difficulty you experience in writing the following elements of the conclusion

Table 4.27

The Researchers' Degree of Difficulty in Writing the Conclusion Elements

	None	%	A little	%	Quite a lot	%	A lot	%
Summarizing the study	11	55%	5	25%	3	15%	1	5%
Evaluating the study	7	35%	7	35%	5	25%	1	5%
Evaluating methodology	8	40%	7	35%	4	20%	1	5%
Recommending further research	8	40%	8	40%	4	20%	0	0%
Drawing implications	5	25%	8	40%	6	30%	1	5%

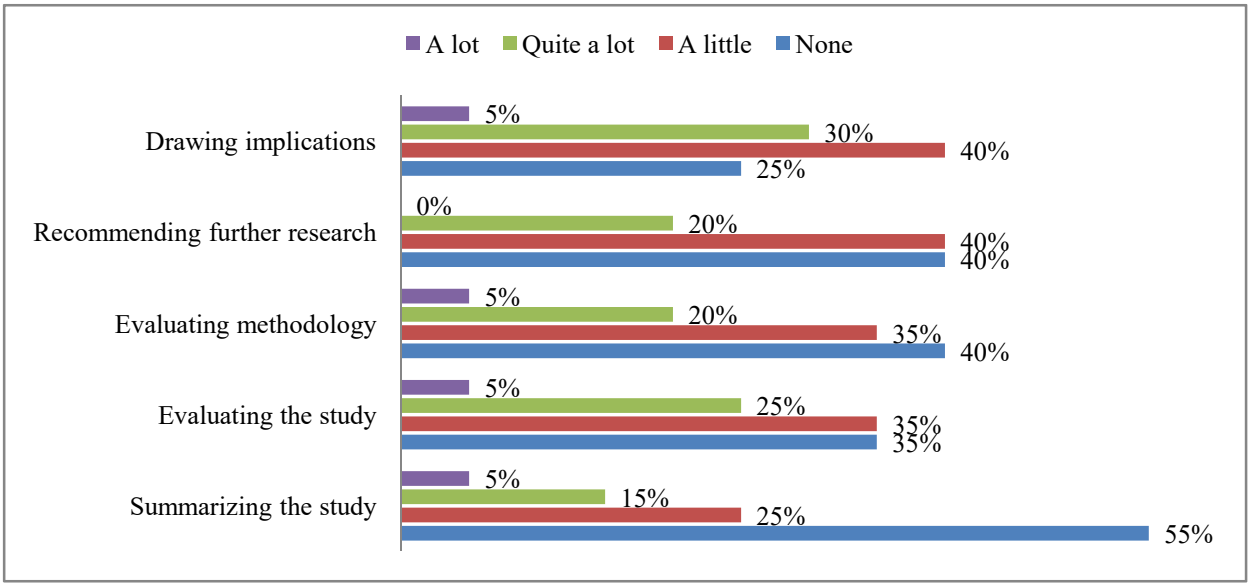


*Figure 4.27*The researchers' Degree of Difficulty in Writing the Conclusion Elements

The table and the graph 4.27 indicate that 55% of the respondents have no difficulty in summarizing the study as part of the conclusion, and 25% have a little difficulty. For evaluating the study move, 70% the participants are equally divided between having no difficulty or little difficulty whereas 25% have quite a lot of difficulty. Similarly, in evaluating the methodology, 40% of the respondents expressed no difficulty, 35% of them have a little difficulty, and 20% of them have quite a lot difficulty. The reason of the difficulty may refer to the nature of the move; evaluating a study needs both research and language mastery to express reliable valid information.

In recommending further research, 80% of the participants are equally divided between having no difficulty and a little difficulty while 20% of the respondents have quite a lot of difficulty. Lastly, in drawing implications, 40% of the teachers have a little difficulty, and 30% of them have quite a lot of difficulty; 5% of them have a lot of difficulty, and lastly 25% of the respondents have no difficulty. The results suggested a problem in realizing this move that may be explained by the nature and the role of the move; drawing implications is one of the vital moves in a conclusion and a research article as a whole as it represents the fruit or the realization of the study aim in reality.

Question 28: What are the main difficulties you face in writing the bibliography section (list of references)?

Table 4.28

The Researchers' Main Difficulties in Writing the Bibliography

	N°	**%**
The length of the bibliography	10	50%
Consistency in writing journals' names and books' titles	8	40%
Adapting references to the style of the journal	9	45%
Forgetting to mention some references	6	30%
The bibliography is not up to date	7	35%
None	3	15%

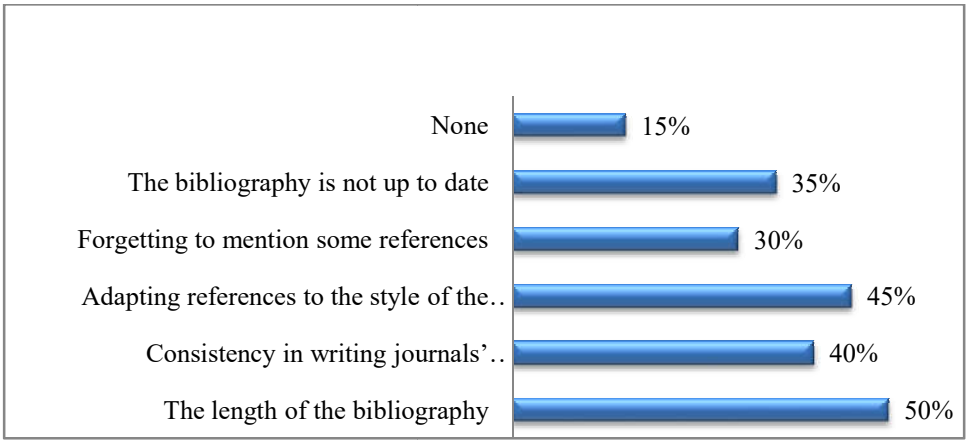


Figure 4.28 The Researchers' Main Difficulties in Writing the Bibliography

In talking about the difficulties in writing the last section in the research article, The table and the graph show that half of the participants have problems in the length of the bibliography that can be either long or short; researchers are either trying to enrich their studies with long lists of references to give them more credibility, or are at the risk of not finding enough studies undertaken in their research area. Moreover, eight (8) participants (40%) have problems in the consistency in writing journals and books names; 45% of them have problems in adapting references to the journals lists as the styles may differ from a journal to the other. The rest seems to have problems in forgetting to mention some references (30%), or the bibliography is not up to date whereas 15% of the respondents declared no problems.

Question 29: What do you think about including English for Professional Academic Purposes (EPAP) in the doctoral program curricula?

Table.4.29

Perceptions of Researchers towards Including English for Professional Academic Purposes (EPAP) in the Doctoral Program Curricula

	N°	**%**
Obligatory	19	95%
Optional	1	5%
No idea	0	0%

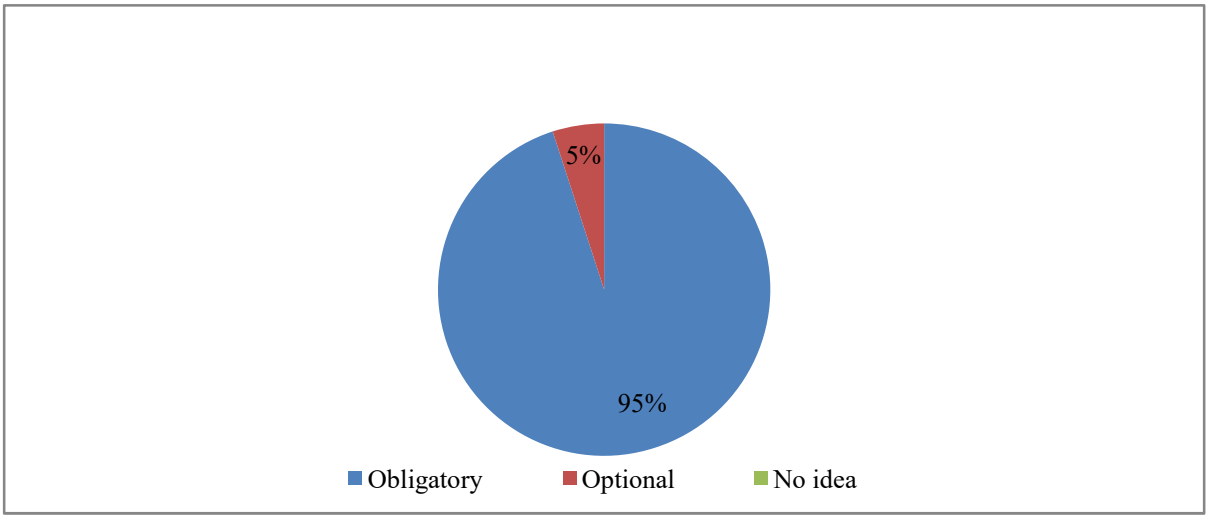


Figure 4.29 Perceptions of Researchers towards Including English for Professional Academic Purposes (EPAP) in the Doctoral Program Curricula

As shown in the table and the graph 4.29, the majority (95%) of the respondents highlights the obligation of including English for professional academic purposes (EPAP) in the doctoral program curricula while just 5% believe that this is optional which may reflect the need of those researchers to receive courses in this field.

Question30: Explain your choice

To complement the analysis of the previous questions, we have ended our questionnaire with an open ended question that has revealed different views. The answers are thematically analysed and presented in the following section:

To explain their choice that was mainly the obligation of including English for professional academic purposes (EPAP) in the doctoral program curricula, the respondents explained that: English helps in reading and writing research as some respondents stated:

“English language helps students to either to read or to write articles, especially the articles of a high quality”

“La majorité des topiques de recherches et publications sont en Anglais to read references and write research”

Due to the fast information available in English it is difficult to access them

without mastering the language, especially in scientific fields, therefore it is

obligatory for a researcher to know the language to be able to get new and updated

information"

Others justified its obligation by saying that English is the international language including Academia

"It is the language of the era. All references are in English. It is the international language"

"It is the international language"

"Because it is the international language"

"c'est obligatoire parce que c'est la seule langue utilisée dans les revues internationales à haute qualité et même dans les communications internationales où le français fait défaut »

And the last group justified this obligation through difficulties researchers have in writing: "Because of the difficulties encountered in writing"

The answers above suggest the importance of teaching English for professional academic purposes (EPAP) in the doctoral program curricula because English learning has become an obligation for Algerian researchers to prove their presence in the international academic context, to be acknowledged, and to share their research findings with the whole world.

4.3 Discussion of the Questionnaire Results

To answer the first research question: What are the rhetorical difficulties that Sétif University sciences teachers face when writing research for publication? The questionnaire was designed and conducted with 20 sciences teachers. Moreover, the intent behind designing the questionnaire was testing the teachers' awareness of the RAs rhetorical structure. The results showed a significant level of awareness mixed with a moderate level of difficulty. To start with, the first five questions of the have helped in collecting data about the participants like having been through the experience of publishing research and being from the specialties that are considered to be from the same family.

Starting from question six (06), the results indicated that half of the participants do not consider research writing difficult; this contradicts with what researchers found after conducting surveys (Tardy, 2004; Flowerdew, 2000, 2001; Duszak and Lewkowicz, 2008), yet some researchers like (Lim, 2002) concluded after his study on Chinese researchers that their level of confidence is high in writing and publishing research. The researchers then stressed the importance of language mastery in writing research (100%) justifying this by the recommendations of journals in accepting just articles with high standards of language (85%), and the role the language plays in presenting the ideas clearly and originally. Flowerdew (2008) explained that researchers are complaining about editors and reviewers' discrimination based on their English. Gosden (1992) stressed that discourse level comes at the top of the editors' evaluation lists.

Similarly, the respondents highlighted the importance of ideas organization in writing research (100%) as it helps in presenting and understanding ideas, and the understanding of the entire text (75%) (Gosden, 1992; Moreno, Rocha, Burgess,Lopez-Navarro,& SAchdev ,2012). Next, the participants declared the first phase of writing a research article as the most difficult phase (80%) encountering problems in English grammar and vocabulary (60%) approving Flowerdew (1999) list of difficulties with grammar on the top. In interviewing Chinese Hong Kong scholars, Flowerdew (1999) found that they have problems in expressing their thoughts and making claims for their research. Moreover, they are influenced by their mother language, and qualitative articles are more problematic for them. Inside research articles, the results demonstrated that the discussion section is the most revised section by reviewers. Effectively, this section has received extensive attention from researchers (Dudley- Evans, 1994; Swales and Feak, 1994; Holmes, 1997; Peacock, 2002) who tried to design reflective templates that can facilitate writing discussion for novice researchers.

In The second section, we explore the researchers' awareness of the different sections' rhetorical structure. Starting with the abstract, the analysis outcome showed that the rhetorical choices the researchers made follow the international conventions of structuring the abstract (Bhatia, 1994; Dos Santos, 1996; Hyland, 2000). For the introduction, the participants' level of awareness has slightly decreased; 10% of the participants confirmed their consideration of both moves limitations of the study" and "source of materials" part of the introduction which

disagrees with Swales pioneering models (2004, 1990), Samraj (2002), and Kanoksilapatham (2005, 2007).

In the methodology section, the researchers proved a high level of awareness in indicating the moves of this section following the international conventions of RAs

writing developed by Nwogu, 1997; Lim, 2006; Swales and Feak, 2012 through models of writing this section; the models present the main pars or moves that a researcher need to present in his article to help other researchers replicate the work.

Differently, the level of awareness has significantly decreased with the results section. Low rates for including "restating methodological issues" (20%) in the results section disagrees with the international models in which it is considered as a conventional move (Thompson, 1993; Kanoksilapatham, 2005, 2007). Kanoksilapatham (2007) suggested that a move is conventional since it exists in more than 60% of the corpus he studied. Another discrepancy is "consolidating results"; it is not part of the results section but it is a part of the discussion, yet 80% of the respondents chose it as a move in the results section. In other words, frameworks developed in literature (Thompson, 1993; Dudley-Evans, 1994; Nwogu, 1997; Peacock, 2002, Kanoksilapatham, 2005, 2007) proved that consolidating results is to be in the discussion.

Although the discussion section seems to be the most difficult and most revised section for research writers, the level of awareness about the rhetorical structure is higher than other sections. The respondents focused on including the conventional and obligatory moves in their discussions (reporting previous research to understand the present one 95%, consolidating results through selected findings (70%), and explaining differences in findings (90%). However, the level of difficulty in realizing those communicative purposes changed (Quite a lot between 5% and 30% and a little difficult between 30% and 60%) in comparison to other sections. Finally, the participants' level of awareness about the moves of the conclusion section is high and goes with the international conventions (Ruiying and Allison, 2003; Bunton, 2005). The only problem with including the move" presenting statistics" by 45% of them though it is not considered as part of the conclusion section but a conventional move in the results section (Kanoksilapatham, 2005; 2007; Brett, 1994; Thompson, 1993).

On the whole, we can assume that the respondents has shown a high level of awareness about the rhetorical structure of the different sections inside RAs as their choices go hand in hand with the models existing in literature. Nevertheless, we still have cases in which our participants mix between the different moves framing each section. The questionnaire ended by exploring the participants' perceptions towards including English for professional academic purposes (EPAP) in the doctoral program curricula; the respondents stressed the obligation and the high need for applying this course because English is the international language and the only choice they have to read and write research. The results of the questionnaire confirm the first hypothesis about the importance of awareness about research writing conventions.

4.4 The Interview Findings' Analysis

The interview was conducted to explore the strategies applied by sciences' teachers in writing their research articles; it answers research question three: What strategies do Sétif University sciences' teachers use when writing research for publication? The interviewees' answers were categorised in an attempt to answer the research question.

Category 1: Difficulties in writing research

Before tackling the strategies followed by science teachers to write research articles, we attempted to have a vision about the different difficulties that urge them to use varied strategies. The opinion that all participants shared is having problems in the language of writing in addition to the problem of structuring the sections mainly the introduction and the discussion sections. This view was clearly expressed by **teacher A** when answering the first question of the interview about the most challenging part of the publication process: "Among my most serious problems in writing research is structuring the article, how to present my information, my results, and the language problem was also serious for me"

Teacher B indicated when answering the first question of the interview that in addition to linguistic difficulties that resulted from his language of instruction, French; he has a more serious problem about the conventions of writing research in English; he was following the French language conventions, yet the language of writing was English:

The first problem to be raised is the language, as engineers, we were structured in French**;** therefore, writing for international journals in English was not easy as the language recommended should have high standards. My problem at the beginning is that I was writing in English but thinking with the structure and conventions of the French language.

As for **teacher C**, he said when answering the second question of the interview about the most challenging section of the research article: "You need to translate all your ideas and objectives into a short passage written in English".

While answering the first question of the interview, teachers also expressed their problems with non- discursive difficulties like identifying the area of research, lack of equipments, products, and lack of references. **Teacher A** explained: "we have to take in consideration the time I spent in finding the research area to work in, the research problem to be covered in the study". **Teacher D** added: "before doing anything, the most difficult step is to fix the objective of the work you want to publish, then comes the preparation of the equipments"

While **Teacher F** revealed: "First, the choice of the topic is a challenge; the test protocols, the lack of products and equipments are also a big obstacle in writing for research and thinking about publication" .

Apparently, sciences teachers are struggling with the international language of research. Linguistic and structural problems in writing RAs are commonly present in the list of difficulties in the publication process; moreover, other non discoursal factors are at play in their problems list. Consequently, they are urged to apply strategies that helped them in overcoming those problems.

Category 2: Seeking assistance from shapers of the research article strategy

To ovoid the discoursal difficulties, sciences teachers seek assistance from the various parts playing roles in shaping the RA. The shapers can be co- authors, supervisors, reviewers, language specialists, or soft- wares for translation. As an illustration, **teacher A** revealed when answering the question about overcoming the difficulties in writing research: "It was through the help of my colleagues". In the same vein, **teacher B** said: "I gave my article to my supervisor and colleagues to help me in the translation. Much of the article has been translated by a friend in Tunisia who had experience in research publication". Then he added when answering the question about the way he organized the sections of his RAs: "A reviewer taught me the articles' structure, but before that I used to follow articles that were written in French". Moreover, **teacher C** indicated answering the questions about seeking help from others: "I learnt from colleagues, who published articles before me, and for my case for the first article, I asked a colleague who have published in the same journal to provide me with the necessary information concerning the guidelines"

Category 3: Modeling published texts strategy

In this strategy, sciences teachers refer to reading articles and imitating their structure or borrowing some expressions from them if needed. As a case in point, **teacher D** explained about his experience of writing his first article in English: "whenever I feel that specific information is not expressed adequately, I read more articles to write better*"*. **Teacher C** answered the interview question about the way she structured her RAs' sections:" I just followed the structure and organization of articles I read before", while **teacher A** said: "I was reading about the topic and learning the structure of RAs. Reading RAs helped me in being introduced to the notion of research articles, its sections and its structure". **Teacher F** added: "I do not have problems with the language or structure of articles simply because I read thousands of research articles in English, so I can write in English, and I learnt the structure through reading articles".

Interestingly, modeling published texts strategy seems the most dominant strategy. Teachers are acquiring the structure and language of research unconsciously through reading RAs preparing for identifying their research area and background.

Category 4: Relying on the mother tongue or the language of instruction strategy

Another strategy sciences teachers adopt is relying on the mother tongue to write the article and translate it later to English, or write it in French because it is the language of instruction in their specialties, then translate the article to English. **Teacher E** described the procedure of writing and the strategy of overcoming the difficulties in writing her articles: "I write and structure my articles in Arabic and give them to a colleague to translate them; he is a professor and used to publisharticles in English. I just provide him with the necessary technical terminology"

On the other hand, **teacher D and B** stated that they rely on their language of instruction as they answered the question about the stages of writing their first articles: "I wrote my article in French and with the help of my Google translation, I arrived at translating it"*;* **Teacher B** said:" I write in French but the structure is following the English language conventions; then I just translate words using software"

Depending on the language of instruction be it the mother language or a foreign language, teachers refer to writing their articles adopting one of those languages. They then translate their papers using soft-wares, relying on language specialists, or seeking help from colleagues that are experienced in research writing.

Category 5: Using Technical language strategy

Instead of expressing ideas through language**,** teachers refer to writing some sections in their RAs like the results section and the methodology through presenting tables, graphs, or statistics. For example, **Teacher B** explained in responding to the question about the easiest section in the research article: "you put your results in tables and graphs…"; while **teacher C** said in answering the same question: "The results section because it takes the form of tables and statistics; generally they are ready before writing the article, so you need just to copy- paste them". Moreover, **Teacher F** clarified: "Materials and methods because the practical is already

prepared; you write the protocols of your tests before starting the experiment; this is done in English through the works that you have already read"

We conclude that the strategy of using technical language is restricted to the results and methodology section. Teachers are finding this strategy as a facilitator because it saves them from using texts to express their ideas and replace them with tables, graphs, or statistical formulae.

Category 6: Revisions recommended in the reviewer's reports

Each time after submitting their manuscripts, sciences teachers receive reports from reviewers containing remarks, questions, or recommendations for modifications. Thereupon, they are obliged to do the necessary modifications to get their works published. **Teacher B** explained while answering the questions about the main reviewers' comments: "Editing, they keep asking for referring to a native speaker, yet if the reviewer is a specialist, he gives comments about technical aspects but no comments concerning the structure". While **teacher C** declared that: "they sent me the journal guidelines to follow them", but **Teacher E** said: "It depends, at the beginning they did not understand the research method I was using, so they asked for clarifications. Later with other articles, the comments are mainly about language structure and references; they ask for changing references" . **Teacher A and D** explained: "They were about the language like structure of sentences and grammar mistakes. I also received comments about the structure of the sections of the articles like the methodology description or results section; they asked for more information".

It seems that teachers agreed that the reviewers' comments are mainly concerned with the language of their manuscripts as they are asked to refine their papers' language, yet they are also asked to provide more information about their work which suggests that some vital moves or steps are missing in their research articles' sections.

4.5 Discussion of the Interview Findings

To answer research question two: What strategies do Sétif University sciences' teachers use when writing research for publication? The interview was conducted with six sciences' teachers. The first three questions were addressing the difficulties the participants encounter during writing for research publication purposes. As a matter of fact, all participants stressed the linguistic and structural problems in writing; the teachers explained that since their language of instruction was not English, they have problems mainly with the language of writing if they aim at publishing their works in acknowledged journals. They added explaining their problems in the difference between their language of instruction being French or Arabic and English; the differences lie in the structure and tenses use.

Similarly, carrying attitude surveys, (Flowerdew, 1999; Duszak& Lewkowicz , 2008; Moreno; Rey-Rocha, Burgess, López-Navarro, and Sachdev, 2012; Tardy ,2004) stated that language problems are on the top of the problems list doctoral students raised when writing for scholarly publication. In their study, for instance, Moreno; Rey-Rocha, Burgess, López-Navarro, and Sachdev (2012) stated that Spanish researchers seem to be reluctant to criticize earlier works in literature which is was acceptable in Spanish medium-journals gatekeepers, yet this lack of critical attitude has transferred to the rhetorical structure of their writings in English causing them problems in the publication process.

As far as structure is concerned, our participants claimed that they have problems in structuring some sections of their articles mainly the introduction and the discussion because they have to parsimoniously and completely present their works especially in the introduction respecting the publication journal space constraints. In the results and methodology sections, teachers refer to technical language whereas in those two sections they need to use language to express their views, discuss their results, and state their objectives, or another possibility is the structure of articles when written in French. Two teachers indicated that they used at the beginning to structure their articles following the French style. Moreno, Rocha, Burgess,Lopez-Navarro,& SAchdev (2012) explained the Spanish researchers problems in structuring their articles by referring to the rhetorical transfer hypothesis. In other words, Spanish researchers used to write articles in Spanish and disseminate them in Spanish journals. Gatekeepers accept

articles in which previous literature is not criticized; however, when writing in English, this seems to be a main reason of their articles rejection.

To overcome their linguistic and structural difficulties, the interviewees' responses revealed that they seek assistance from shapers of the research article. The participants showed a high degree of reliance on their colleagues and supervisors help in writing research. The main role seems to be in terms of revising the language presenting the scientific material and structure of articles. Interviewees explained that they seek help in the translation of texts from French / Arabic to English, revisions to manuscripts language and structure, or guidelines about the structure of the sections. The results lend support to Gosden (1995) & (Li, 2005) who studied the textual changes made by supervisors to their candidates' manuscripts. The results of the studies proved changes in terms of framing texts like adding transitional words to show cause and effect purposes, revision of cohesive devices, and rhetorical changes. The second shaper of the research articles is language specialists. The interviewees declared that they seek help from translators, or English language teachers to help them in editing and proofreading their manuscripts. Lillis &Curry (2006) explain that article shapers can be language professionals whose concern is the linguistic revision of the manuscript namely: copy editors, translators, proofreaders, and discipline specialist.

Modeling published texts is the second strategy all participants agreed on. The interviewees indicated that through their readings for identifying the research problem or providing background for their research topic, they learnt the structure of RAs. They added that they even learnt the technical language related to the research area they work on through their readings. This approves what Li (2005) found after following a doctoral student writing a RA. The student used the conventional moves of a research article's introduction (Swales, 1990, 2004) unconsciously after reading articles. The second technique is borrowing from literature. When writing their RAs, researchers may borrow expressions, phrases, or sentences that adequately present their ideas. Li& Flowerdew (2007) demonstrated that borrowing from texts takes two (02) forms; respondents may keep notes of useful expressions they meet during reading literature like transitional words, technical terms, and reporting verbs, or they take articles for the purpose of selecting language that can be used during the process of writing.

The language of instruction our interviewees received varies between French and Arabic. Thereupon, sciences teachers explained the obligation to write their RAs in French or Arabic, then translate them using soft-wares. However, this posed a real problem in terms of the language structure and ideas inside sections, tenses, the effectiveness of soft- wares translation, and time consumed in achieving a high standard of language. Li (2005) study illustrated a Chinese doctoral student who wrote his first article in Chinese in one week, to spend a month and a half translating it to English. Thus, the answers of the interviewees confirmed that shapers assistance strategies, modeling texts, or translation are an effective tool in facing the structural difficulties of writing RAs which goes hand in hand with our second research hypothesis.

The interviewees expressed a lower level of difficulties in the results and methodology sections. They justify that by the nature of the sections. In fact, they said that the dominating characteristic of those two sections is the use of technical language or graphs, tables, and statistics. Therefore, the need for expressing ideas through language is less stressed. Sionos (1995) described how French researchers refer to technical language to overcome their linguistic deficiency. They demonstrated an interest in content over form due to the poor command of language, and they believe that facts and figures can speak for themselves. The interviewees in our study went on by stating that the problem in the discussion section is the high need to argue and prove the significance of their findings through language, yet in the results and material and methods section, numbers, maps, figures are dominating the scene to speak for themselves.

The last point to be discussed in this section is revisions sciences teachers need to carry after receiving reviewers' reports. It seems that all interviewees agreed on receiving recommendations about refining the language or the structure of their manuscripts. In some cases, reviewers ask for more information especially in the discussion, results, and methodology section for the purpose of replication of the study by other researchers. According to Robetrts, Coverdal,Edenharder,& Louie,2004; Spigt and Arts, 2010; Wincka, Fonsecab, Azevedob, &Wedzicha, 2011; Bornmann ,Weymuth , Daniel; 2010, reviewers can assess aspects like instrumentation, data, and population, statistics and data analysis, discussion of results, clarity and structure of the paper, and the logical flow of ideas and arguments. . Fonsecab, Azevedob, &Wedzicha (2011) recorded the reviewer's duties as providing constructive assessment of the

manuscript, reporting unethical performances like plagiarism, writing the report in a constructive manner

4.6 Conclusion

We have seen so far in this chapter the description of sciences' teachers' questionnaire and interview findings displayed in tables and graphs with possible interpretation of the obtained results. Based on those findings, sciences teachers showed equal rates for the claim of RAs'writing difficulty, and they justified that the reason behind their problems is mainly linguistic in addition to ideas structure. On the other hand, they showed a good level of RAs' rhetorical structure awareness, yet some deficiencies are still present as they ignore realizing vital steps in those sections.

The interview outcome, on the other hand, showed that teachers presented a group of strategies namely: seeking the assistance of their colleagues and supervisors, following the structure of published articles, translating their manuscripts from French or Arabic to English, and using technical language to overcome their obstacles in writing research. The next chapter will play the confirmatory role. Analysis of sciences teachers' articles and reviewers' reports will confirm or disconfirm the findings obtained from the questionnaire and the interview.

Chapter Five

Chapter Five: Document Analysis Findings and Discussions

Chapter Five

Document Analysis Findings and Discussions

5.1 Introduction

The first phase of exploring Sciences teachers' awareness about the rhetorical structure of research articles and rhetorical difficulties in realizing communicative purposes inside sections was presented through the questionnaire analysis in the preceding chapter. Moreover, the interview findings came to envisage the strategies applied to overcome the problems. Similarly, this chapter will stress the second phase of the exploration by presenting the findings of document analysis. The first kind of documents to be analysed is fifteen (15) research articles.

In the analysis procedure, moves and steps are going to be identified in the submitted version and the final version of each article. The aim behind this operation is to draw a comparison between the structures to localize the area of weakness. The divergences in the structures of each section help us in diagnosing the Sciences teachers' rhetorical difficulties. Then the chapter will present the findings of the reviewers' reports analysis to support or reject the results of the articles analysis and give deeper understanding of the structural organization problems the participants of the study have. Finally, the chapter ends up with a synthesis of the main results obtained from all the research instruments in attempt to answer all the research questions.

5.2 Research articles' Analysis Results

In this section, we will present the analysis of all the research articles' sections; the analysis will cover the articles' first submitted version and final published one. During the analysis data are to be classified, compared, and interpreted.

5.2.1. Analysis of abstracts.

To start with, analyzing the move structure of all the submitted articles' abstracts and the final published articles' abstracts revealed three main categories:

- **Abstracts following the standard structure (model) and received no modifications**

In this category, the abstracts are composed of five moves namely: introduction, methods, results, and conclusion or implications. During the analysis, we noticed that both versions of the abstracts are the same, and the last version has undergone under no modifications after being reviewed. Articles four (4) and eleven (11) are examples of this category.

Abstract: **(M1)** Several types of instabilities can menace the personnel and equipment in the open cast mines. Their kinematicis dependent commonly on the nature, the structure, the fracturing and the strength of the rock mass. A scientific assessment vis-a-vis their equilibrium is suggested. For this task a considerable amount of field work must already carrying out to supply the necessary data ie: geometric, mechanic and geologic parameters **(M2)** The main purpose of this research is identifying different modes of slope failures that may develop on the career "ENOF" of Jebel Gustar, **(M3)** by a multi-step analysis. For this task, i) a structural analysis; ii) an estimation of the rock mass and discontinuity mechanical properties, iii) a rating of the rock mass quality, iv) and a numerical simulation of the stability are procedurally used. **(M4)**The results matched well with the field observations. They proved the poor stability of the career, showing a typical example of a bad slope-design. **(M5)**The application of such approaches can help stabilizing the mine and ensure the safety and a sustainable production.

Figure5.1 The abstract of article eleven (11)

Abstract

(M1) The Algero-Tunisian transboundry basin contains a multi-layered aquifer referring to two principal productive levels:Zebbag (Cenomanian–Turonian) and Abiod (Campanian–Maastrichian) carbonate formations. The hydrogeological functioning of this karstic system is largely determined by tectonics (Gafsa–Tebessa, Boulabâa faults...). With regard to the growing water demands, groundwater resources in the study area are subject of intense exploitation. **(M2)**Hence, the objective of this study is to refine the understanding of recharge processes in watersheds by a combined isotopic and hydrogeochemistry investigation. **(M3)**The TDS of the sampled waters vary between 10 and 490 mg l^{-1}. It increases from the mountain regions towards the discharge area due the weathering formations, recharge process, and fracturing rate**.(M4)** The isotope compositions from the sampled springs indicate that water composition is influenced by both the southern Mediterranean Sea and Atlantic Ocean precipitations, but the patial distribution of isotopic composition does not differentiate between the different recharge sources. Karst aquifers are likely fed by direct infiltration of the meteoric water and snow sublimation. Tebessa-Kasserine region contains a number of hydrothermal occurrences in the carbonate formations in the western and the eastern parts.

They refer to the low enthalpy fields of Youkous area (Algerian territory) and Boulabâa area (Tunisian territory), respectively**.(M5)** The geochemical and isotopic characterization of these thermal waters indicates a considerable recharge contribution by subsurface flow Bhydrothermal upwelling from the deep hot resources.

Figure5.2 The abstract of article four (4)

On the other hand, article eight (8) was divided into sections that do not really reflect the standard structure, yet when we analysed the different communicative purposes presenting the moves; we discovered that the five moves are in the abstract. The first version of the abstract was the same published one.

Background: (M1) Natural products from medicinal plants such as thymoquinone (TQ), the major compound derived from *Nigella sativa L*. Which has received considerable attention in recent years due to its diverse pharmacological properties, including antioxidant and anti inflammatory activities? **(M2)**The aim of this study is the investigation of prophylactic and curative effects of TQ against carbon tetrachloride (CCl4)-induced hepatotoxicity in male albino rats.

(M3) Materials and Methods: Hepatotoxicity was induced in rats by intraperitoneal administration of 3 ml/kg, 1:1 (V/V) mixture of CCl4 and olive oil both before and after treatment for 7 days with TQ. Prophylactic and curative effects of TQ were evaluated by estimating the activities of alanine aminotransferase (ALT), aspartate aminotransferase (AST) and alkaline phosphatase (ALP).

(M4)Results: CCl4 administering by intraperitoneal injection led to significant (P<0.05) increase in serum transaminases (ALT and AST) and phosphatase (ALP) respectively compared with control animals. Thymoquinone showed significant (p<0.05) hepatoprotective activity by decreasing the activities of ALT, AST, ALP in both prophylactic and curative effects. These results revealed that thymoquinone possesses significant hepatoprotective and hepatocurative effects against CCl4-induced toxicity via its antioxidant and anti-inflammatory activities but the hepatocurative effect was the most effective.

(M5) Conclusion: Thymoquinone is a compound known for its pharmacological proprieties. We illustrated in this work, its important effect against hepatotoxicity induced by a toxic agent as CCL4 when it's administrated in prophylactic or curative way

Fig5.3 The abstract of article eight (8)

We may understand that since the abstracts are respectively following the international standard model of structure proposed by Hyland (2002), the reviewers did not recommend any modifications and accept them as they are.

- **Abstracts following the model differently, and received no modifications**

In this part, we deal with the second category of abstracts; it was found that they differently follow the standard international model of analysis, yet they have undergone through no modifications after the review. The corpus analysis demonstrated that many articles are following different moves structure like M2, M3, M4, M5 in article three (3) in which each title shows a new move:

Aim: The present study aimed to investigate the chemical constituents and antioxidant potential of *Santolina chamaecyparissus* polyphenolic extract (SCPE).
Materials and Methods: The extract containing phenolic compounds, was extracted with ethyl acetate and luteolin-7-O-glucoside was separated and purified using flash chromatography on silica gel column. This isolated compound was identified according to its physicochemical properties and spectral data (UV, LC–TOF-MS, 1H NMR, 13C NMR and 2D NMR). *In vitro* antioxidant activity of the isolated compound and SCPE was investigated using DPPH•, ABTS+, reducing power, superoxide anion radical scavenging and β-carotene bleaching assays.

Results: Results showed that SCPE and luteolin-7-O-glucoside exhibited significant antioxidant activity. The antioxidant activity of SCPE was comparable to that of luteolin-7-O-glucoside. Luteolin-7-O-glucoside was isolated for the first time from *Santolina chamaecyparissus* polyphenolic extract.
Conclusion: Results of the present investigation clearly indicate that SCPE and isolated compound (luteolin-*7-O*-glucoside) have powerful antioxidant capacity against various antioxidant systems *in vitro*.

Figure5.4 The Abstract of article three (3)

Article six (6) is composed of moves two, three, four, and five as the Figure shows. The moves are realized through the titles (aim, methodology, results, and conclusion)

Aims: The objective of the present study is to evaluate the effect of the aqueous extract of *Ruta montana* L. on the fertility in adult male and female rats.
Methodology: Forty healthy adult rats of both sexes were divided into 4 Groups of 10 rats each. During the treatment period, 100, 300 and 600 mg/kg/day of the extract were orally administered to Groups I, II and III respectively, while the control group received distilled water and served as control. The daily administration was carried out for a period of 90 days.
Results: The results did not show any significant change in ovaries weight. However, a significant decrease in testis, epididymis, and seminal vesicles weights was detected, as well as a reduction in the number and the motility of spermatozoids in rats treated with the doses of 300 and 600 mg/kg.
Conclusion: A dose of 300 mg/kg and 600 mg/kg of aqueous extract of *Ruta Montana* L. was able to cause a decrease in sexual organs weight of male rats and in the number and the motility of spermatozoids.

Figure 5. 5 The abstract of article six (6)

Article fourteen (14) Abstract rhetorical structure is realized in moves: two, three, four, and five:

Abstract: **(M2)**This study aimed to investigate the correlation between body condition score (BCS), blood biochemical metabolites, milk yield (MY) and quality (Mfat) in Montbéliarde cattle (31 cows) reared in 5 farms of Algerian semi arid area. (M3) The BCS was measured in dry and peak of lactation (6 weeks after calving). Blood samples were taken at the time of body condition (BC) measurement for determination of energy (Glucose, cholesterol, triglycerides and B-Hydroxybutyrate), nitrogen (urea and albumin) and mineral (calcium) metabolites. Milk yield was recorded in the 6^{th} week of lactation (peak). A sample of milk for each cow was used to determinate milk fat, density and acidity. (M4)The results showed a significant decrease in postpartum BCS accompanied by an increase in cholesterol and B-Hydroxybutyrate (BHB) concentration. The correlation analysis showed that BHB concentration in pre calving was negatively correlated with BCS ($r=-0.321$; $P<0.05$) and cholesterol ($r=-0.308$; $P<0.05$). In

postpartum, BCS was negatively correlated with cholesterol (r=-0.416; P<0.05), urea (r=-0.366; P<0.05) and BHB (r=-0.487; P<0.05). However, the level of milk production decreased significantly with high glucose (r=-0.449; P<0.05) and BHB (r=-0.514; P<0.05). The fat content increased significantly with blood triglycerides (r=0.681; P<0.05) and BHB (r=0.522; P<0.05) concentration, indicating a high mobilization of body reserves used for the synthesis of milk fat. (M5)In conclusion, it can be assumed that the rate of BHB seems to be the best indicator of the nutritional status of dairy cows that determines their production level and quality.

Figure 5.6 The Abstract of article fourteen (14)

The second moves structure in the second category is composed of M1, M3, M4, and M5. Articles one (1), two (2), and thirteen (13) belong to this category; article one is the first example of this structure:

Abstract : (M1)The present study is focused on a comparative evaluation of logistic regression (LR), frequency ratio (FR), information value (IV), and weight of evidence (WoE) methods for landslides susceptibility assessment in Bouandas region, North of Setif (NE Algeria).(M3) Information about landslide inventory and 17 pre-defined causative factors were prepared from multiple sources. The four methods are used to derive the weighted value of causative factors along the study area. (M4) The results were validated using receiver operating characteristic and the areas under the curves obtained using the FR, LR, IV and WoE methods are 0.86, 0.84, 0.81 and 0.79, respectively. (M5)The landslide susceptibility map produced from FR model is proposed to be more useful for the study area. It could reveal the relative importance of different factors in explaining landslides, and it may assist engineers in land-use planning.

Figure5.7 The abstract of article one (1)

The analysis of the second category with its two divisions (structure of move two, three, four, five and move one, three, four, five) suggests that all the abstracts have moves of methods, results, and conclusion. The only difference is in move one: introduction or statement of the topic and move two of stating the aim of the study. Noticeably, when reading the abstracts, we feel that whenever the topic is stated, the aim is implicitly included, and the same goes for the aim of the study. Each time the abstract starts with the aim we automatically understand the topic.

- **Abstracts not following the standard structure, and the final version has not been modified**

When analyzing the rhetorical structure of the abstract in article Seven 7, both the submitted and final versions, we noticed that the present moves are the introduction (1), the aim(2), methods(3), and results(4), and move five is missing.

Abstract: (M1) Slope failures (SF) in mountainous terrain often occur during or after heavy rainstorms, resulting in the loss of life and damage to the natural and/or built environment. Assessing areas susceptible to SF is essential for land use planning in threatened areas. This article presents an didactic basedanalysis of the potential contribution to geo-spatial approaches for predicting SF qualitative exposure in mountainous environment. **(M2)** Its main aim is to assess the impact of the geologic, geomorphic, rainstorms,and anthropogenic factors in the initiation of SF in Zaarouria region. (M3) 219 events (1996–2016) were inventoried through images interpretation and field surveys and were compared to the physical parameters of the terrain to give a SF susceptibility index value using a simplified model. Vulnerability and risk maps are also established. The Standard deviation classification was used to delineate various susceptibility, vulnerability and risk zones, namely, nil, low, moderate and high. Field data on SF were employed to evaluate and validate the susceptibility zonation map. **(M4)**The results of this study demonstrate that SF are largely governed not only by geoenvironmental conditions but also by human activities, mainly roads and construction.

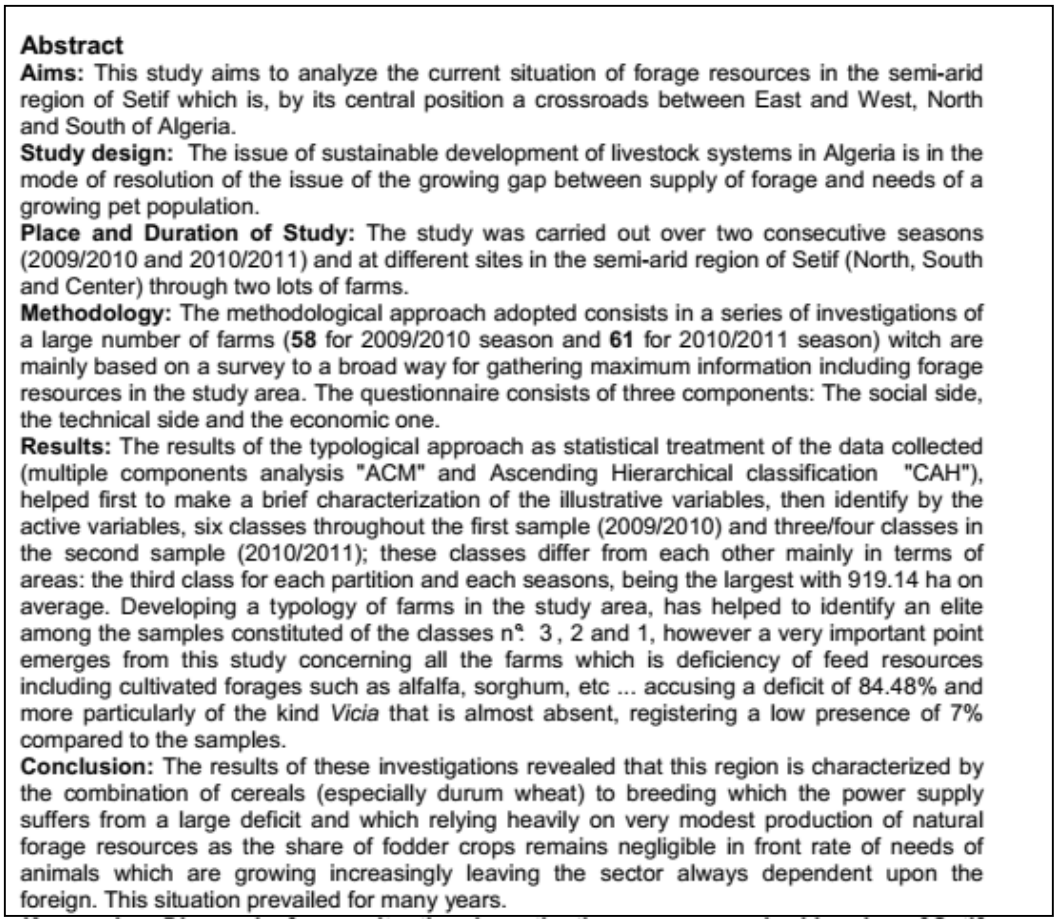
Figure 5.8 The abstract of article seven (7)

Then the same goes for article twelve (12) in which M2, M3, and M5 were present, and in article fifteen (15), moves one, two, three were dominating. The most interesting point is that the abstracts' structure in the first and final versions is the same; this organizational structure may be due to the nature of the research area under analysis or the journal regulations.

- **Abstracts not following the standard structure, and the last version received modifications**

The last category of articles is with abstracts not following the standard structure in the submitted version, yet the final version has been changed after being reviewed. For instance, the abstract of article ten (10) was at the first phase composed of four moves: aim, methodology, results, and conclusion; the sections were already divided, but the problem was in putting steps

of the third move (Methods) in two separate moves (Study design), (place and duration of the study). Then in the final revision, we found out that the abstract is reorganized to follow the standard structure with the presence of all the five moves with omitting sections' division. This explains that following the rhetorical structure of the abstract section is the best choice to present data and avoid extensive revisions.



Abstract

Aims: This study aims to analyze the current situation of forage resources in the semi-arid region of Setif which is, by its central position a crossroads between East and West, North and South of Algeria.

Study design: The issue of sustainable development of livestock systems in Algeria is in the mode of resolution of the issue of the growing gap between supply of forage and needs of a growing pet population.

Place and Duration of Study: The study was carried out over two consecutive seasons (2009/2010 and 2010/2011) and at different sites in the semi-arid region of Setif (North, South and Center) through two lots of farms.

Methodology: The methodological approach adopted consists in a series of investigations of a large number of farms (**58** for 2009/2010 season and **61** for 2010/2011 season) witch are mainly based on a survey to a broad way for gathering maximum information including forage resources in the study area. The questionnaire consists of three components: The social side, the technical side and the economic one.

Results: The results of the typological approach as statistical treatment of the data collected (multiple components analysis "ACM" and Ascending Hierarchical classification "CAH"), helped first to make a brief characterization of the illustrative variables, then identify by the active variables, six classes throughout the first sample (2009/2010) and three/four classes in the second sample (2010/2011); these classes differ from each other mainly in terms of areas: the third class for each partition and each seasons, being the largest with 919.14 ha on average. Developing a typology of farms in the study area, has helped to identify an elite among the samples constituted of the classes n°: 3 , 2 and 1, however a very important point emerges from this study concerning all the farms which is deficiency of feed resources including cultivated forages such as alfalfa, sorghum, etc ... accusing a deficit of 84.48% and more particularly of the kind *Vicia* that is almost absent, registering a low presence of 7% compared to the samples.

Conclusion: The results of these investigations revealed that this region is characterized by the combination of cereals (especially durum wheat) to breeding which the power supply suffers from a large deficit and which relying heavily on very modest production of natural forage resources as the share of fodder crops remains negligible in front rate of needs of animals which are growing increasingly leaving the sector always dependent upon the foreign. This situation prevailed for many years.

Figure 5.9 The abstract of article ten (10) before revision

In the final version, after analyzing the different communicative purposes in the abstract, we found that the moves were reorganized to follow the standard structure of the abstract (move one, two, three, four, five)

Abstract: (M1) The issue of sustainable development of livestock systems in Algeria, is in the mode of resolution of the issue of the growing gap between supply of forage and needs of a growing pet population. In this context, (M2)this study aims to analyze the current situation of forage resources in the semi-arid region of Setif which is, by its central position a rossroads between East and West, North and South of Algeria. (M3)The study was carried out over two consecutive seasons (2009/2010 and 2010/2011) and at different sites (North, South and Center) through two lots of farms. The methodological approach adopted onsists in a series of investigations of a large number of farms (58 for 2009/2010 season and 61 for 2010/2011 season) which are mainly based on a survey to a broad way for gathering maximum information including forage resources in the study area. The questionnaire consists of three components: The social side, the technical side and the economic one; also making a socio-geographical characterization of vetch in the same region. (M4)The results of these investigations revealed that this region is characterized by the combination of cereals (especially durum wheat) to breeding which the power supply suffers from a large deficit and which relying heavily on very modest production of natural forage resources as the share of fodder crops remains negligible in front rate of needs of animals which are growing increasingly leaving the sector always dependent upon the foreign. (M5)This situation prevailed for many years

Figure 5.10 The abstract of article ten (10) after revision

The second article that has received modification is article five (05) in which the first version is composed of moves: one, three, four, five, but the last version is just composed of moves: three, four and five. The modifications were the result of the reviewer recommendations.

Before

ABSTRACT

(M1)*Santolina chamaecyparissus* L. is a small medicinal herb, cultivated in Europe, Asia and Africa due to the antihelmintic, antiseptic, antispasmodic, bactericidal, fungicidal, digestive and vulnerary 10 properties.(M3) Despite this, *S. chamaecyparissus* aerial part extractions have not been examined for anti- inflammatory and xanthine oxidase inhibition properties.

S. chamaecyparissus aerial parts were extracted with solvent of varying polarity: methanol crude) extract (CE) chloroform extract (CHE), ethyl acetate extract (EAE), and aqueous extract (AE). The content of total phenolics, and flavonoids in all the extracts were determined with spectrophotometric 15 methods. (M4) Among all the extracts analyzed, the EAE exhibited a higher phenolic and flavonoids content than other samples: 373.83 ± 0.23 mg gallic acid equivalent and 7.86 ± 61.51 mg quercetin equivalent/g of dried weigh, respectively. 19 CHE and EAE, showed a high inhibition of xanthine oxidase P>0.05 with IC_{50} of (0.051± 0.0002 (mg/ml) and (0.052±0.0003 mg/ml) respectively, followed by CrE (0.091±0.001 mg/ml). The inhibition of xanthine oxidase by CHE and EAE showed a less efficient than allopurinol (IC_{50} = 0.0082 ± 0.0005 22 mg/ml), The methanol extract clearly demonstrated anti-inflammatory effects by reduced ear edema induced by PMA with 61.51%.25 **(M5)**Our results indicate that the *S. chamaecyparissus* extracts (SCE) possesses potent ntioxidant and anti- inflammatory properties, and might be valuable natural source that could be applicable to both the medical and food industries.

Figure5.11 The abstract of article five (5) before revision

After:

(M3)*S. chamaecyparissus* aerial parts were extracted with solvent of varying polarity: crude extract (CrE) chloroform extract (CHE), ethyl acetate extract (EAE), and aqueous extract (AE). The content of total phenolics, and flavonoids in all the extracts were determined with spectrophotometric methods. **(M4)**Among all the extracts analyzed, the EAE exhibited a higher phenolic and flavonoids content than other samples: 373.83 ± 0.23 mg gallic acid equivalent and 7.86 ± 61.51 mg quercetin equivalent/g of dried weigh, respectively. CHE and EAE, showed a high inhibition of xanthine oxidase (XO) P>0.05 with IC_{50} (concentration inhibitory of 50% of XO activity): (0.051± 0.0002 mg/ml) and (0.052±0.0003 mg/ml) respectively, followed by CrE (0.091±0.001 mg/ml). The inhibition of xanthine oxidase by CHE and EAE showed a less efficient than allopurinol (IC_{50} = 0.0082 ± 0.0005 mg/ml). The CrE clearly demonstrated anti-inflammatory effects by reduced ear edema induced by PMA with 61.51%. **(M5)**Our results indicate that EAE possesses potent antioxidant and CE noticed anti-inflammatory properties, and might be valuable natural source that could be applicable to both the medical and food industries.

Figure5.12 the abstract of article five (5) after revision

In article nine (9), we find in the first submitted abstract moves: one, three, four, and five to be moves: two, three, four, and five in the final version.

Before revision:

Abstract:

(M1) The Poaceae is one of the important families consisting of 10,000 species. The species belonging to the family found everywhere in the world. The seeds of the family have great variation in their seed mass and size, considered one of the important factors affecting germination percentage and production rate**.(M3)** Present observation has been carried out on the study of germination, production and the morphological characteristics of the widespread weeds seeds in the north east of Algeria (the Setifian high plateau). Germination of seeds was carried out in laboratory under different temperature (5°C, 10°C,15°C, 20°C, 25°C, 30°C).Production of abundant small seeds is a common adaptation that ensures a high probability of dispersal and re-infestation. Eight characteristics were used to identify eight species of seeds which belong to Poaceae family. The morphological characteristics in which the study was based on are: shape, color, size (length, breadth), solidity, brightness, surface, Appendages, weight per 100seeds. **(M4)**Considerable differences were noticed between the various species of weeds seeds**. (M5)**The study of germination, production and morphological characteristics of seeds allows identifying the different seeds mixed with cultivated plant; it also allows knowing the various species of weeds in fields. So such studies help to develop different strategies to control weeds

Figure5.13 The abstract of article nine (9) before revision

After revision:

Abstract:

(M2)Aims: Seed characters are very helpful for identification of a large number of species or genera. In many cases, morphological characteristics, germination and production of seeds, can be used to distinguish species and varieties.

(M3)Methodology: Study it thoroughly in the laboratory where researchers often observe it by naked eyes, in addition to the reliance on references and researches concerning describing seeds to make the study effective and successful it must be conducted carefully with continual vigilance because of the smallness of some seeds so we use magnifying glass, the optical microscope and pocket lamp to see the different external parts of seeds. Germination of seeds was carried out in

laboratory under different temperature (5°C, 10°C, 15°C, 20°C, 25°C, 30°C). Production of abundant small seeds is a common adaptation that ensures a high probability of dispersal and reinfestation. Eight characteristics were used to identify eight species of seeds which belong to Poaceae family. The morphological characteristics in which the study was based on are: shape, color, size (length, breadth), solidity, brightness, surface, appendages, weight per 100 seeds. Considerable differences were noticed between the various species of weeds seeds.

(M4)Results: The seeds of the family have great variation in their seed mass and size, considered one of the important factors affecting germination percentage and production rate. Germination percentages ranged from 80% to 100%, depending on the species and temperature. The highest germination percentages were reached at alternating temperatures (05°C/30°C). Studies on seed production potential in *Bromus sterilis*, *Bromus rubens*, *Bromus lanceolatus* and *Bromus madritensis* showed that each plant produces an average of 3700±637, 5000±592, 3000±380 and 4500±426 seeds respectively. *Lolium rigidum* produces 950±304 seeds /plant whereas *Lolium multiflorum* produces 900±258 seeds/Plant. One isolated *Avena sterilis* plant can produce over 235±14 seeds. Thus *Avena alba* produced 64±15 seeds per plant. Each weeds species shows morphological characteristics different from the plant or other species, these morphological characteristics are not restricted to the external form of the plant only but it can be on level of different other parts of plant like fruit and seed.

(M5)Conclusion: The study showed that the seeds morphological characteristics can be helpful in identification of species. The ability to produce seeds with big capacity of germination is, most probably, a mechanism by which species of Poaceae as other weed species adapts to new environmental situations and ensures its survival by facilitating the dispersal of its seeds in time and space.

Figure5.14 The abstract of article nine (9) after revision

We notice here that in article ten (10), the revisions led the abstracts to follow the standard model, while leading article nine (9) to be closer to the model of analysis by following its last four moves(Aim, methods, Results, conclusion). In article five (5), the structure has been changed under the request of the reviewer who considered the topic statement and research gap as part of the introduction.

5.2.2. Analysis of introductions.

The rhetorical structure of the introduction section is envisaged through three main moves namely: establishing a topic, preparing for the present study, and introducing the study. We divided our corpus into four categories. The first category is introductions realized through move one and move three without modification after the review. The second category is introductions that have not been structurally changed after the review procedure with the presence of the three moves. The third category is an introduction presented by move one without being modified after the review, and the last category is introductions realized through different structures and with modification after the review process.

- **Introductions of move one and move three without modifications after the review procedure**

Under this category, introductions' main character is domination of move one (Establishing a topic) and move three (Introducing the study) through the presence of different steps in all the introductions. For instance, **article four (4)** is made of move one:

Establishing the topic and reviewing literature:

"Carbonate rocks account about 15% of global outcrops. They held more than 60% of the world's oil and 40% of completely depends on water containing karst aquifers (Williams,2008)"

The Third move consists of step two: Describing Procedure

"*The preparation of hydrological, geological, and geomorphological thematic maps,…"*

and step one; Outlining the Purpose

"*this study aims the evaluation of water resources..."*

Article five (5) goes under the same category as move one is deprived for topic establishment

"*Phenolic compounds are widely distributed in plants and in recent years they have gained much attention, due…"*

Move three, on the other hand, is presented by step one: Outlining the purpose

"*The aim of our study was to evaluate the…"*

Moreover, **article eight (8)** introduction starts by establishing the topic (Move one)

"*Thymoquinone (TQ) is the major activecompound derived from the medicinal Nigella...*"

Then move three is present through step one: outlining the purpose

"*The aim of this research was to evaluate the in vivo effects…*"

The same goes for **article Fourteen (14):**

"*Nutrition is the first item of expenditure in dairy farming…*"

"The present study aims to investigate the relationship…"

In **article nine (9)**, we find topic establishment and review of lit in move one:

"*Weeds are the biggest problem ……..*"

"Farron [18] confirmed that gathering and study…"

Followed by aim outlining to form move three:

"*The main purpose is attempting to find the effective…*"

Article eleven (11) is similar to **article nine (9)** in the first move, yet the third move is shown in step two: describing the procedure:

"*The extractive industry is considered as a fundamental …*"

"An appropriate quarryedge design not only leads to enhancements in slope stability and safety but also minimizes charges, prolongates the longevity of mines and reduces the stripping ratio (Karaman et al., 2013)…"

"*For this task our study combines four approachs to evaluate …*"

The dominance of move one and move three in those articles may be the result of the significance of those two moves in the introduction section while the role of the second move is linking the two moves together.

- **Introduction with three moves without modification after the review**

In the second group of articles that have not received modifications in the last version, the introduction is present trough the three moves of the introduction, yet the steps of the moves may differ. As an example, **article six (6)** first move is summarized in topic establishment

"*The use of plants in the management of diseases has been reported since antiquity…"*

Move two is presented by gap indication

"*To our knowledge no studies were conducted and published…"*

Move three is constructed in step two: describing procedure

"*The aqueous extract was prepared according to the method described…."*

The second example is **article twelve (12)**; the three moves were found in the introduction through the presence of their steps:

Move one: topic establishment

"The *Atlas chain NE Algeria is characterized by…"*

Move two: step one: indicating a gap

"*Despite its importance, the slope movement susceptibility (SMS) is not taken into account in…"*

Move three: step two: describing procedure

"*The mapping of SMS depended on the quantity and quality ……".*

Finally, **article thirteen (13)** displays a different structural organization in its introduction. Move one is demonstrated in establishing the topic and reviewing previous literature

" *In many parts of the Atlas Tellian chain, mass wasting caused damages in the natural and built environment…"*

"*A number of methods for SMS zonation using GIS have been proposed in the susceptibility literature, which can be…".*

Move two is realized through step two: indicating a gap

"*Up to date, only some researchers have undertaken SMS analysis in northeast of Algeria…"*

Move three is displayed in step one: outlining purpose, step two: describing procedure, and step three: announcing findings

"*The main objectives of this research include the characterization…"*

"The LR model includes five main steps. The first step…"

"The resulted SMS map shows the probability of occurrence…"

The presence of the three moves in the second group of introductions may result from the discipline specificity (Earth Sciences: **article twelve (12), thirteen (13)** and the order of steps inside moves seem to be of a logical order.

- **Introduction with move one and no modification after the review**

The case in this category is article ten (10) with its special introduction. In this article, move one was the only move in the introduction by establishing the topic and reviewing literature. The final version of the article kept the same introduction which may suggest that the nature of the research may be behind this structure:

" *For millennia, animal production has been associated with all agricultural practices [1]. Indeed, food is undoubtedly one of the major constraints to livestock in Algeria. …"*

- **Introductions with different structures with modifications after the review procedure**

In this category, we present the different structures of introductions that received modifications after the review process. First, in the first version of **article one (1),** move one was displayed through topic establishment and review of literature

" *Landslide is among the recurrent natural hazard problems that arise widespread and that have ……..of the Tellian chain (Gadri et al. 2015; Bourenane …"*

While move three was presented by step one: outlining the purpose.

"The aim of this work is to investigate the potential of FR and LR…"

The rest of the introduction was description of the setting which should be part of the methods section

"*Bouandas common (North of Setif province) is a hilly area situated in Babors mountains chain in the northestern of Algeria. It covers an area…"*

After the revision, the introduction structure has changed to be:

Move one: topic establishing and literature review:

"*Ground motions play an important role in the natural evolution of landscapes…"*

"*Landslide susceptibility assessment is commonly approached by three broad methods (Dai and Lee 2002)…"*

Move two: step one: indicating a gap:

"*In the existing literature, there are a few studies of landslide susceptibility that…"*

Move three: step one: outlining the purpose

"The *aim of this work is to take advantage of FR, LR…"*

And **step three: announcing findings**

"*The output results are significant to find out where the landslide hotspot areas are…"*

The modifications in this article introduction are the results of following the standard structure of the introduction section to build a well structured article.

Article two (2) presents modifications at the level of the order of moves and presence of steps. In the first submitted introduction, the first move was present in topic establishing and literature reviewing

"*With the rapid development of satellite technologies; the Remote Sensing (RS) techniques offer a successful hi-tech tools…"*

"*Their applications in geologic characterization are very promising mainly in arid zones devoided of vegetative cover (Bersi et al. 2016)…"*

Followed by move three: step two: describing procedures.

"*study involved evaluation of the utility of Sentinel-2 multispectral data in the characterization of geological features in the western part of Tebessa region…"*

Next, the second move proved presence through the second step: gap indicating.

"*This region suffers sadly from a glaring absence of the geological coverage necessary to carry out any geoenvironmental research…"*

Finally, move three again appeared through announcing findings in step three.

"*The methodology used in this research provides an efficient means to the characterization of the geological structures in inaccessible zones in a relatively short time…"*

The structure of the introduction changed to start with move one through topic establishing and literature reviewing

"*Geographic Information System (GIS) and Remote sensing (RS) play a relevant role in geoenvironmental issues such as, geology (Hadji et al. 2014a"*

Move two: step two: gap indicating

"*This region and its surroundings lacks a geological mapping/information, which hinders geologists who study geological structures…"*

Move three: step two: procedure describing

"*We preferred touse Sentinel-2A data than common multispectral data, due to its higher spectral and spatial resolutions in the VNIR and SWIR region. The methodology applied in this research offer the opportunity to analyse surface…"*

These modifications are the result of a logical high standard level of moves structuring in research articles. **Article three (3)** demonstrates a modification at the level of the third move. The first move in both versions aimed at establishing the topic; move two also aimed at indicating a research gap; the difference was in move three that moved from being presented by step two:

"*In this study, luteolin-7-O- 41 glucoside was isolated, characterized and the antioxidant activity of this compound and of SCPE was 42 examined, for a better characterization and exploitation of these natural products …"*

To be presented by step one:

"*The present study aimed to investigate the chemical constituents and antioxidant potential of Santolina chamaecyparissus polyphenolic extract."*

Article seven(7) and article fifteen (15) have not seen much modification; in article **seven (7)** both versions, Move one was in topic establishing and literature reviewing; move two was in gap indicating, and move three was in step three: announcing findings.

"Of *all morphogenetic phenomenon, slope failures (SF) are the most injurious to man and his physical environment in the Northeast of Algeria (Guettouche et al. 2013; Bourenane et al. 2014)…"*

Move two, step2*:*

"*Their glaring lack are aggravated by the glaring lack of a regulatorymapping providing a general framework…*"

Move three, step 3

"*The investigation method depends on several parameters such as: the work scale, the physical characteristics of the terrain…"*

However, the only difference in the two (02) versions lies in move three. In the second version, the writer added more details to the results.

In **article fifteen (15)**, the writer has changed the order of steps in move three. At the beginning, move one was in establishing the topic and reviewing the literature

"*The Mediterranean basin includes some of the highest levels of plant diversity of any region on Earth (Allen, 2003). According to Medail and Quézel (1999) …"*

Move three was realized through step one and step two orderly:

"*The objective of this study is to analyse vegetation and land cover change in the National Park of El Kala..."*

"*NDVI images were derived from two Landsat images..."*

After the revision, the third move started with step two and ended with step one:

"*In this work, NDVI images were derived from two……..... Therefore, this study aims to analysing vegetation and land cover…"*

The modifications in the last category are summarized in following the standard international model in terms of moves and steps order or steps choice. On the whole, all the changes fall in raising the researchers' awareness about the logical order of ideas and the choice of steps that would better present the different moves in the introduction.

5.2.3. Analysis of the methodology section (materials and methods).

This section generally comes in articles under the name of materials and methods, yet in Earth Sciences, we find another section labeled' study area' preceding methodology section, so we joined the section of research area or setting to "Materials and Methods". For the analysis, we referred to a model that was developed from literature to present the main existing moves. The model is composed of four (04) moves: describing materials, describing experimental procedures, detailing equipments (optional), and describing statistical procedures respectively. During reporting findings, we will proceed through moves presenting data in terms of two (02) categories: moves with modification after the review and moves without modification after the review.

- **Move one without modification after review**

First, we will start with sections that did not receive modifications at the level of the first move. For instance, articles: **two (02) (2), four (4), nine (9), eleven (11), fifteen (15), twelve (12), and thirteen (13)** were characterized by having the three steps of move one namely: listing materials, detailing source of materials, and providing background of the materials.

Move one; Step one:

"*The study area used in this remote sensing assessment encompasses the 1/50,000 Youks les…" (Article2)*

"*Jebel Gustar open pit is among the most important career…" (Article 11)*

Move one; Step Two (02):

"Situated in the extreme Northeast of Algeria, bounded by the Mediterranean sea to the North and Tunisia to the East, and lies between 36°55' to 36°90'N and 08°16'to 08°43'E (Figure. 1)…"(Article15)

"The basin is located in the northeast of Algeria between 4°58'55.42" to 5°35'39.29"E longitudes and 35°45'03.01" to 36°20'53.22"N… " (Article12)

Move one; Step Three:

"*The climate in the area is Mediterranean with a rainy season which extends from November to April …" (Article thirteen (13)*

"This trans-boundry basin allows the integration of Saharan platform air streams into the atmospheric circulation (Celle-Jeanton et al., 2001a.)…" (Article 4)

The stability of move one in the previously mentioned articles may be the results of their structure as they follow the standard international conventions.

On the other hand, in articles: three **(3), five (5), six (6), eight (8), fourteen (14)**; move one was displayed through step one: listing materials and step two: detailing source of materials.

Move one: step one:

"Santolina chamaecyparissus was..."(Article 4)

"The aerial part of Santolina chamaecyparissus (SCE)…" (Article5)

"Male Swiss albinos mice (20 - 30 g)…" (Article 5)

"Ruta montana L. was collected in October…"(Article6)

"Male and female Albino Wistar rats were used in this study. …" (Article 6)

Move one: step Two:

"were purchased from the Animal House of Pastor institute Alger…"(Article 8)

"in the region of Sétif high plateau which situated in the north east of Algeria between the two…"(Article9)

"Montbeliard cows reared in five farms to acceptable level of mastery…"

(Article14)

All the articles in this category are from the field of biology which suggest that the presentation of move one through step one and step two may be discipline specific.

- **Move one with modification after review**

The second group is made up of sections that witnessed modifications at the level of the first move. As a case in point, **Article one (1) and article seven (7)** showed move one through step one and step two. After being reviewed, move one has been displayed in step one, step two, and step three:

Before:

"The overall dataset consisted of 61,382 cells with 408 rows and 281 columns…". (Step one, article1)

"Seventeen landslide-related factors were extracted for the landslide susceptibility…" (Step two, article1)

After*:*

"Bouandas municipality that runs through Jebel Takintoucht, is…" (Step one, article 1)

"Several Formations of the ''Flysch and Tell'' thrust sheets …" (Step two, articleone)

"It is situated between 050300100E to 050904000E longitudes…"(Step three, article1)

Differently, **article ten (10)** was consisted of step one and step three in the first version, to be all the steps in the final version:

Before:

"current situation of forage resources in the semi-arid region of…"(Step one)

"Table 1. Distribution of farms surveyed by municipality …".(Step three)

After:

"maximum information including forage resources …" (Step one)

"The farms surveyed were selected randomly,Designated from the management of agriculturalservices (DSA) of the wilaya of Setif…"(Step two)

"Table 1. Distribution of farms surveyed by municipality …."(Step three)

Noticeably, the modifications undertaken in the three articles was by adjusting the move by including the three step to follow the standard structure that articles published in prestigious journals follow.

- **Move two with modification after the review**

The first group of articles in this second move received modifications after the review process. To illustrate, **article seven (7)** move two was summarized in step two: Detailing experimental procedures, yet after the review, move two in the final version was displayed by the three steps of move two namely: Documenting established procedures, detailing procedures, and providing the background of the procedures.

Before

"The lithology and lineament were digitized on the basis of three geological map…"

After

"Slope faillures (SF) involve flowing…… of different types of movements (Rouabhia et al. 2012)...In this study, at first, the total landslides observed in the study area were split into two.".

"*Several approaches consider that main damage to the exposed elements..."*

Article one (1) move two was also presented by step two, but the modification joined step three to the move:

Before:

"The landslides inventory of the study area was compiled from aerial photographs, satelliter images, and extensive field surveys…"

After

"The outline of this research passes through four steps."

"At first, a landslide inventory map was prepared using…"(Step two)

"Several referential studies considered slope aspect as a meteorological-related factor in landslide occurrence (Pradhan and Lee 2010)…"(Step three)

Different from them, **article thirteen (13)** move two was realized through step one and step two to be supported with step three in the final version:

Before

"Several researches have used the same method for analysis in different parts of world successfully [32-33]…"

"In this case, the applied method passed through the following steps…"

After

"Several researches have used the same method for analysis in different parts of world successfully [32-33]…"

"In this case, the applied method passed through the following steps…"

"Studies on SMS analysis show that disparity in lithology is an important parameter causing slope instability, as geological and structural…"

The modifications at the level of steps may be the result of the necessity to add that information for making the research replication feasible.

- **Move two Procedures without modification after the review**

Though the second move in the second group of articles was presented in several ways, no modifications after the review process were activated. As a case in point, articles: **five (5), nine (9), eleven (11), and fifteen (15)** followed the model in terms presenting the three steps of move two:

Step one:

"The extractions were carried out using various polar and non polar solvents, according to the method of Markham [9]…"(Article5)

"The criterion of seed germination was visible radical protrusion [24]…" (Article 9)

Step two:

"One hundred grams of powdered aerial part were macerated…" (Article 5)

"The seeds placed in Petri dishes were placed at different temperature in a growth chamber germinator (5°C, 10…"(Article9)

Step Three:

"Anti-radical activity was determined spectrophotometrically according to Robak and Gryglewski [13]…"(Article 5)

Seeds morphological discrimination is related to external description of all the characteristics of……(Article 9)

The articles: **six (6), eight (8), fourteen (14)** demonstrated move two through step one and step two.

Step One:

"The aqueous extract was prepared according to the method described by [10]… "(Article 6)

"The induction of hepatotoxicity was based on the procedure described by Wang et al [9]…" (Article 8)

Step Two:

***"2.4. Experimental Design:** 50 Albino Wistar rats of both sexes…" (Article6)*

"the albino rats were randomly divided into eight treatment groups of seven…"(Article 8)

The articles: **two (2), three (3), and ten (10)** summarized move two in step two; this can be justified by the nature of the research study under investigation.

"The methodology is based on remotely sensed imagery, GIS as well as a field work and the correlation with the neighbouring geologic maps. The used data consists of a Sentinel…"(Article 2).

"Polyphenolic extract was prepared by maceration of …" (Article 3)

"These surveys are mainly based on a questionnaire to a broad …" (Article 10)

Lastly, the articles **four (4) and twelve (12)** showed move two through step two and step three to facilitate research replication.

Step two:

"*A number of field trips have been organized for sampling collect across the study area…" (Article 4)*

Step three:

"Standard methods were used to determine the major ion composition of water samples..." (Article 4)

- **Move three: Detailing Equipment (Optional)**

Move three was present in article **two (2) and article three (3)** materials and methods' sections in the first and final versions. The absence in other articles can be explained by its character in international conventions as an optional move.

"The directional filters are used strictly for the..."

"The apparatus used was an Agilent 6210 LC-TOF-MS instrument with a Poroshell…"

- **Move four (Describing Statistical Procedure)**

Move four proved presence in ten articles: **one (1), three (3), eleven (11), five (5), six (6), eight (8), ten (10), fourteen (14), twelve (12), and thirteen (13)**; it was not modified after revision:

"Five categories were created for the analysis (Fig. 6i) TWI ¼ ln a ð Þ ð =tan b SPI ¼ a tanb…"(Article 1)

"Statistical analysis: Data were represented as mea..."(Article 3)

"Statistical analysis: The results are expressed as the mean…"(Article 6)

"The data obtained were analyzed using one-way analysis of variance…" (Article8)

However, we noticed in article **seven (7)** that move four was added in the final version which explains the importance of this move in this section of the research article.

"*It was determined that a high risk resulted from the combination of a high susceptibility with a high or moderate vulnerability..".* While it was absent in **article nine (9)**.

5.2.4. Analysis of the results section.

The main character of this section in our corpus is either being presented in a separate section (Results) as it was the case with articles: **three (3), four (4), five (5), and eight (8)** or being a part of a section labeled 'Results and Discussion'. Consequently, the analysis in the second case went through the different moves of the section trying to separate them from the moves of the discussion section. The model adopted in the analysis is derived from previous studies; it has four main moves namely: Restating methodological issues, justifying methodological issues, Announcing results, and commenting results. Move one; three, and four, have a number of steps that serve the realization of the communicative purpose of the move. In presenting the results, each move analysis results are going to be presented in details substantiated with extracts from the original text

- **Move one: Restating methodological issues without modification after the review**

Under move one, we have four steps: describing aims and procedure, stating research questions, Making hypothesis, and listing procedures or methodological issues. The results of the structure analysis are divided into two (02) categories. The first category is about sections that did not receive modifications at the level of the first move after the review. For example, in **article two (2), three (3), four (4), and six (6)**, move one was realized through step one: describing aim and purpose and step four: Listing procedures or methodological issues:

"A direct extraction of lineaments was performed… " (Article 2, step four)

"to identify all structures and linear areas… "(Article 2, step one)

"Structural elucidations of …were carried out…" (Article 3, step one and four)

"To evaluate the hydro chemical facies… " (Article 4, step one)

"TDS, and pH values are plotted together… " (Article 4, step four)

"in order to evaluate the effect of the chronic… " (Article 6, step one)

"4 groups of rats were used: … " (Article6, step four)

In **article: five (5), seven (7), eight (8), nine (9), ten (10), eleven (11), thirteen (13), fourteen (14), and fifteen (15)**, move one was summarized in step four: Listing procedures or methodological issues:

"The standard deviation method was used… "(Article 7)

"pre-treatment of rats with TQ for… " (Article 8)

"The study requires taking 05 seeds randomly of each species… " (Article 9)

"With two approaches (ACM and CAH)… " (Article 10)

"The two-step classification of pre and post calving body… "(Article14)

"When applying the geometric correction, … "(Article 15)

"Inhibition of XOD and the 222 scavenging …were measured … " (Article5)

The analysis of move one results in articles that did not receive revisions at this level suggest that step four in move one is the most frequent step because results are reported in reference to the model or tool used each time.

- **Move one with modification after the review**

The second category is made up of sections that received revisions at the level of the first move. **Article one (1) and twelve (12)** were characterized by the presence of step four as the only representative of move one to change to another structure after being reviewed: **In article one (1)**:

Before revision:

"The analysis of FR demonstrate… " (Article 1, step four)

"reclassified this map into five qualitative classes… "(Article 1, step four)

After revision:

"The natural break classifier was applied four… " (Article 1, step four)

"The landslide FR indicates the importance of… "(Article 1, step three)

After revision:

"applying the linear indexing model… " (Step four)

"SMS assessment is more factual if it is related to an …" (Step three)

- **Move Two: Justifying methodological issues**

Since move two does not have any steps, the presence of this move is realized through two different ways. First, move two was added to **article one (1) and five (5)** after the revision:

"Results were verified using … the ROC curves (Pradhan 2013)."

"Addition of water … (36.6% yield) [19]."

Second, Move two was in the first and final versions of the article: **two (2,) three (3), four (4), and nine (9)**.

"using Cetin and Kavak (2007)… "(Article 2)

"ADH and are determined by the reduction of NBT [21]… " (Article 3)

"Stuyfzand water classification (Stuyfzand 1986), based … "(Article 4)

"weeds on the basis of their seed bank available in the soil [39] … "(Article 9)

However, move two was not found in article: **six (6), seven (7), eight (8), ten (10), eleven (11), twelve (12), thirteen (13), fourteen (14), and fifteen (15).** The results suggest the researcher's unawareness of the importance of this move.

- **Move three without modification after the review**

Move three is realized through three main steps: reporting results, substantiating results, and invalidating results. In reporting the results of the third move structure analysis in the results section, data are divided into two (02) categories. First we start with sections in which the third move has not received any modifications after the review procedure. As cases in point, **article two (2), four (4), seven (7**) have move three realized through all the steps namely: step one: reporting results, step two: substantiating results, step three: Invalidating results.

Step one:

"The results allowed the discrimination of the structures boundaries….."(Article2)

"Physico-chemical … are presented in table 1… "(Article 4)

"The low-susceptibility class is 64.994Km^2…" (Article 7)

Step two:

"the geological map of the study area (Fig. 10)…" (Article 2)

"As seen in figure 2, karst waters exhibit…" (Article 4)

"is in perfect agreement with our field observations…" (Article 7)

Step three:

"The filter N45 was not considered…" (Article 2)

"mixing processes files with no dominant anion or cation…" (Article 4)

"Unfortunately this class coincides with the concentration of the main issues…" (Article 7)

The second group of articles **one (1), three (3), five (5), six (6), eight (8), nine (9), ten (10), twelve (12) and fifteen (15)** has the third move displayed in step one and step two:

Step One:

"slope greater than 20 (FR = 1.60)…"(Article 1)

"the isolated compound was identified as luteolin-7-O-glucoside…"(Article 3)

"The yields of methanol…… acetate extracts of SCE were 9.71%..."(Article 5)

"caused hepato-cellular ……elevation ($p < 0.05$)…" (Article 8)

"The two NDVI ...resulted from the subtraction of the..." (Article 15)

Step two:

"(*CDA 5 ; FR = 1.55); (Q; FR = 1.06) (Table 1)…" (Article 1)*

"uteolin-7-O-β-glucoside is … agreement with the literature [19]…" (Article 3)

***"Fig. 1.** IC50, Inhibitory concentration of…" (Article 5)*

"Table 1: Effects of pre-treatment…damage in rats (n=7))…" (Article 8)

"Are displayed in Figures 3 a, b, …" (Article 15)

Finally, move three is present in **article thirteen (13)** through step one and step three:

"The SMS map illustrated five categories, expressed as probabilities of SM …" (Step one)

"Slope aspect did not show well-defined trends…" (Step three)

- **Move three: Announcing results without modification after the review**

The second category is made up of sections that were modified after the review process. **Article fourteen (14)** third move was displayed through step one, two, and three

"Changes in body condition score (BCS) and blood parameters..." (Step one)

"The same results were reported by Jilek et al (2008) in Czech..."(Step two)

"opposite direction but the difference was non-significant..." (Stept hree)

Then, after the revision, move three was summarized in step one and step two

"Changes in BCS and blood parameters..." (Step one)

***"Table 1:** Pre and post calving variability..." (Step two)*

The results of this move shed light on its vital role in writing the results' section. In details, step one and step two are the most frequent steps as they reflect the main aim of the section by reporting and substantiating results, yet step three is less frequent because of its nature; not all the research studies include invalid data, or researchers avoid writing about invalid data to give more credibility to their studies.

- **Move Four: Commenting results**

Move four is the last move in the results section; it is realized through five main steps namely: explaining results, making generalizations or interpretations of the study, evaluating results, summarizing results, and stating limitations. After analyzing the rhetorical structure of the results sections, results concerning move four are divided into four categories. The first category covers articles that do not have move four: **article two (2), article seven (7), article eight (8), and article five (5)** are cases that represent this category. The second category is about **article twelve (12)** that witnessed the presence of move four displayed in step one and step two after the review procedure:

"The reunion of these conditions made these areas moderately … "(Step one)

"Building should be restricted though safe sites …" (Step two)

The third category is about **article fourteen (14)** from which move four, presented by step two and step four, was removed in the final version:

"This positive correlation indicates that the highest..." (Step two)

"Analysis of variance showed.. the level of milk production and quality.." (Step four)

The last category covers the sections in which move four was present in the first and the final versions. In **article nine (9)**, move four was presented by step two:

"because of high percent germination … to wheat [33]".

In **article six (6), eleven (11), and article thirteen (13),** move four was realized through step 1:

"It was clear that animals treated by…" (Article 6)

"(RC) values showed the relative importance of each causal…" (Article 13)

"toppling cases, indicated in table 2, have ... volumes which can be…." (Article 11)

In **article one (1), three (3), four (4), ten (10), and fifteen (15)** the fourth move was presented by step one and step two:

"This is certainly due to the existence of resistant…" (Article 1 ,step 1)

"This indicates a good correlation between these…" (Article 1 ,step 2)

"The reducing powers of ……. increased with…" (Article 3, step 1)

"SCPE was found to be an efficient scavenger…" (Article 3, step 2)

"It can be explained by the contribution of evaporate…" (Article 4, step 1)

"the good correlation between carbonates mineral…"(Article 4, step 2)

"In Figures 3 a and b, … areas with a maximum value..."(Article 15, step 1)

"it appears that the decrease ...due to the following …"(Article 15, step 2)

The analysis of all results in all the articles revealed that researchers refer mainly to step one: explaining results and step two: making generalizations or interpretations in order to comment their results. This can be explained by the nature of the section as it mainly aims at presenting results, explaining them, and draw some generalizations from as its the name suggests. On the other hand, other researchers get satisfied with move three announcing their results as they do not feel the need to explain, interpret, or comment.

5.2.5. Analysis of the discussion section.

Similarly to the results section, the discussion section comes into two (02) shapes: as part of the section "Results and Discussion" or as a separate section labeled "Discussion" like in **article three (3), four (4), five (5), and eight (8).** In both cases, we followed during the analysis a model that was derived from previous literature based on the structure of already published articles in prestigious journals active in the same research area. The model presenting the

rhetorical structure of the discussion section is made up of four (04) main moves: contextualizing the study, consolidating results, stating limitations, and suggesting further research. Under move one, we have two (02) steps while move two is realized through six (06) steps. Similar to previous sections, we will report the findings of the structural analysis of each move in details.

- **Move one: contextualizing the study absence in discussion**

Under move one, we have two (02) main steps: describing established knowledge and the second step is generalizing, claiming, and deducing previous knowledge. The discussions' analysis results at the level of move one are divided three (03) categories. First, discussions that do not have move one; it covers articles: **one (1), two (2), ten (10), eleven (11), twelve (12), thirteen (13), and fifteen (15);** the absence of move one in seven articles suggests the unawareness of the researchers about the importance of move one. In fact, starting the discussion with providing backgrounds from literature facilitates the explanation of the findings that are supposed to be presented later.

- **Move one: contextualizing the study with modification after the review**

Second, this category is presented by article three in which move one was modified after the review procedure. At the beginning, move one was realized through step one, yet after the review, it was enlarged to cover both step one and step two; it proves the magnitude of both steps in realizing this move and paving the way for the next one.

Before Revision:

"*Activity of phenol is mainly … oxygen 184 quenchers [22]".*

After revision:

"Medicinal plants constitute one…important human health implications [20]". (Step one)

"β- carotene undergoes … .absence of an antioxidant…" (step two)

- **Move one: contextualizing the study without modification after the review**

Finally, move one was present in the first and final versions of some articles through different steps without going under any modifications. In **article four (4), six (6), seven (7), and fourteen (14)**, move one was presented by step two: generalizing, claiming, and deducing previous knowledge:

"According to total hardness classification (Stuyfzand, 1986, 1993), the sampled waters…" (Article 4)

"It is well known that the weight, …closely regulated by …[22]" (Article 6)

"Our simplified approach allowed the comprehensive study of…" (Article 7)

"The effects of diet … ; in concentrations of blood metabolites…" (Article 14)

In article five (5), move one was presented by step one:

"Phenolic compounds are generally… .groups in the aromatic ring) [15,16]"

In **article eight (8) and nine (9),** move one is presented by step one and step two:

"CCl4 induced liver injury in…kills cells [12, 13]…" (Article 8, step 1)

"This study is the first one to determine hepatoprotectctive …" (Article8, step 2)

"Seed production that is to say…weed control strategies term [3]… "(Article 9, step 1)

"Thus Avena alba produced 64±15 seeds per plant [35]…" (Article 9, step 2)

In article **six (6), seven (7), fourteen (14),** the researchers and reviewers accepted realizing move one through the second step; this may be explained by the nature of the research are tackled or lack of previous literature to support the discussion with it. However, the stability of the discussions in the previous last articles may refer to the researchers' presentation of move one by both steps and not just get satisfied with one step.

- **Move two : consolidating results added after the review**

Move two is the longest move because it can be realized through six (06) steps: Restating methodology (purposes, research questions, hypotheses, and procedures), Stating selected findings, referring to previous literature, Explaining differences in findings, Making overt claims/generalizations, and : Exemplifying. In presenting the move and steps analysis results, Data is divided to three (03) categories. The first category covers **article twelve (12)** in which move two was added through steps two and step three after the review:

"According to the produced results, … controlled by the" (Step two)

"Agrees with the findings of other researchers… (Kamp et al. 2008)" (Step three)

- **Move two : consolidating results with modification after the review**

The second category covers article one (1) and three (3) where move two was modified after the revision. In **article one (1),** move two was presented by step five to add to it step three after the review:

Before revision

"Our findings showed that the existing high and very high susceptibility ... of settlements".

After revision

"These show that the four models have reasonably excellent accuracy in redicting ..." (Step five)

"*moderate, high and very high) using the natural break classifier (Pourghasemi et al. 2012)..." (Step three)*

In **article three (3),** move one was realized through step: one, two, three, four, five, and six to be after the review presented by all the steps except step four:

the polyphenolic extract of ... isolated from this extract were analyzed (step one)

"Ferrous 208 ions chelating activity, etc [25]..."(Step two)

"due to polyphenols components known for their antioxidant activity [26]..."(Step three).

"Superoxide is poorly reactive ... various diseases [21]..." (Step four)

"The result clearly indicates that ... have an interesting ABTS ..." (Step five)

"Figure 1: Structure of luteolin-7-O-glucoside..." (Step six)

- **Move two: consolidating results without modification after the review**

The third category covers discussions in which move one was realized differently, yet no modifications were undertaken after the review. Article fourteen (14) and article eight (8) second moves are presented by step one , step two, step three, step four , and step five. Article nine (9), and eleven (11) second moves are presented by step: two, three, and five. In article ten (10), we have step five presenting the second move; I article six (6), we have step: two, and five. In article two (02), we have step one and step two. In article seven (7), we have step two, four, and five. In

article (15), we have step one, two, three, and six, and in article thirteen (13), we have step one, two, and five. What we notice is the dominating presence of step five, step two, and step three that can be explained by a logical explanation of the researchers understanding to the discussion section structure; it seems that researchers believe that the discussion section is just about presenting main findings, comparing them with literature and come at the end with generalizations or overt claims.

- **Move three: Stating limitations of the study**

Under this move, we have no steps; it is present in **article eleven (11):**

"The use of a single model, do not provide a reliable solution to open…"

- **Move four: suggesting further research**

Similar to move three**,** we have no steps; It is present in **article eleven (11):**

"*A slope stability calculation should never be treated as an end in itself…"*

We notice almost a complete absence of the sixth and seventh moves (limitations of the study and suggesting further research); they may be left to the conclusion section.

5.2.6. Analysis of the conclusion section.

The conclusion is the last section in research articles; little research in literature has been done on conclusions in comparison the other sections in research articles. The analysis of the moves and steps will be carried following the model of Ruiying and Allison (2003). Three main moves take part in the model namely: summarizing the study, evaluating the study, and deductions from the research. Similar to previous sections, we will present the results of each move in details taking into accounts modifications after the review procedure.

- **Move one: Summarizing the study:**

Under this move, we have no steps. The results of the analysis concerning the first move will be divided to three categories. The first category is conclusions that do not include move one; we mean **article three (3), seven (7), and fourteen (14)**. The second category is presented by article **thirteen (13)** where move one was added after the review:

"*The relevant SM characteristics were developed… This reveals a satisfactory stability of the performance of the model at a medium scale".*

The third category covers articles in which move one was present in both versions of the article; we mean article: **one (1), two (02), four (4), five (5), six (6), eight (8), nine (9), ten (10), eleven (11), twelve (12), and fifteen (15);** here we present some examples from different disciplines:

"In this study, GIS-based... maps were derived using ArcGIS tools…" (Article 1)

The study allowed us…two (02) groups NW–SE a…"(Article4)

"It was concluded that the oral administration of…the motility of spermatozoids."(Article 6)

"The spread of some… characteristics (form, color, size…)…" (Article 9)

"Added to those other major difficulties of… three orders…" (Article 10)

Through the results, we understand the high level the researchers' awareness about the vital role of the first move in the conclusion.

- **Move two: Evaluating the study is absent**

Move two is realized through three main steps: Indicating significance/ advantage, indicating limitations, and evaluating methodology. Moves and steps analysis results are going to be reported in three main categories. The first category includes **article eight (8) and six (6)** where move two was absent.

- **Move two: Evaluating the study with modification after the review**

The second category covers **article thirteen (13)** where move two was presented by step one to be realized through step one and step three after the review, and **article eleven (11)** in which again move two was summarized in step one to be displayed by step two, and three after the review:

Before revision

"The resulting map supports the observation..." (Article 13)

"This research allows… develop in the of Jebel Gustar career." (Article 11)

After the revision

"In both Ouled Driss and Machroha hilly districts… Similar maps were created out of terrain parameters". (Article 13, step 1)

"The adopted model is sufficient to predict slope failures at." (Article 13, step 3)

"A number of uncertainties and practical problems …" (Article 11, step 2)

"This method have been depeneds in numerical..". (Article 11, step 3

- **Move two: Evaluating the study without modification after the review**

The third category covers articles that have move two presented differently by different steps, yet no modifications were conducted after the review. In the first group of articles (**one (1), three (3), five (5), seven (7), and fourteen (14),** move two is realized through step one; for example:

"These maps can provide a preliminary assessment of…" (Article 1)

"Results of the present investigation clearly indicate that SCPE a…" (Article 3)

"The presented study could explain the effectiveness…" (Article 5)

"This research demonstrates the performance of GIS-based approaches…" (Article7)

In the second group of articles (**two (02), ten (10), and twelve (12),** move two is presented by step one and step three; for instance:

"The study allowed us to test the efficiency of specific……" Article 2, step1)

"The use of Sentinel- 2A for geological discrimination gives good….."(Article 2, step3)

"The problems of the sustainable development of the systems…a very modest contribution of the local cultivars…" (Article 10, step1)

"The adverse conditions of the climate….to this kind of activities…" (Article 10, step3)

The third category covers three different structures; in **article four (4),** step two was the only representative of the second move:

"The *complexity of the structural features of the study area and the heterogeneity"*

In **article fifteen (15)**, step three is present for move two:

"*The threshold technique value was successful regarding the…"*

In **article nine (9**), step one, two, and three are present:

"The obtained results allowed identifying the most spread…"

"dentification of species of poaceae is complicated because of the similarities…"

"The ability to produce seeds with different degrees……..."

- **Move three: Deductions from the research is absent**

The last move of the conclusion section contains two (02) main steps: recommending further research and drawing pedagogical implications. In presenting the results of the move and its steps analysis, we go through three categories of findings. The first category contains article: two (02), three (3), six (6), eight (8), fourteen (14), and fifteen (15) in which the move was totally absent; we can explain this by the researchers' unawareness of the importance of indicating them in their research articles.

- **Move three: Deductions from the research with modification after the review**

The second category covers article one in which the move structure has been changed after the review from being presented by step two to be displayed in step one:

"Finally it is necessary to promote an understanding … to enable the public to develop a realistic expectation for slope safety" (step two)

"Our findings acknowledge that in similar hilly areas.. based on statistical models…" (Step one)

And **article eleven (11**) in which move two was presented by step one, yet the step was removed in the final version because it was indicated in the previous section

"*By comparing results of these four approaches, the stability…" (In the first version)*

- **Move three: Deductions from the research without modification after the review**

In the last category, move three was realized differently in varied articles. In **article four (4), five (5), and thirteen (13)**, it was realized through step one:

"o*f these reservoirs … of definite relationship karst-climate change".(Article 4)*

"*The near future is to isolate the bioactive compounds……..." (Article 5)*

"*The recommended decision*s pass through the generalization of the application of such *techniques…."(Article 13)*

In **article nine (9) and ten (10),** it was realized trough step two:

"*The developmental variations … identification key…"(Article 9)*

"*To improve the food of the animals is the following :…"(Article 10)*

In **article seven (7) and twelve (12),** it was realized through both steps:

"*It can be replicated by other studies to estimate the susceptibility,…" (Article 7, step one)*

"This situation requires the promotion of a geo-risk culture among population and decision-makers" (Article 7, step 2)

"Finally the database collected is a good source of information to serve other studies or other disciplines…"(Article12, step 1)

"If the study is approved by the decision-makers of the province, it can serve as an effective information system for… model allowing the results refining…" (Step two)

5.3. Discussion of the Research Articles' Analysis Findings

To answer the first research question: What are the rhetorical difficulties that Sétif University Sciences teachers face when writing research for publication? Fifteen (15) research articles containing six sections: abstract, introduction, methods, results, discussion, and conclusion were subject to move and steps analysis. The rhetorical structure or move analysis was carried adopting models from previous literature. The second objective of analyzing those articles is to ass the compatibility of Sétif University Sciences' teachers' articles' structures with the international conventions of research writing. Although the analysis of the moves and steps in articles' first and final versions showed a good level of compatibility with models reflecting the structure of highly valued articles published in prestigious journals, yet there were some noticeable differences.

First, the abstracts in the research articles are characterized by having different structures. We have noticed that only three articles (four (4), eight (8), and eleven (11) followed the model of Hyland (2000). On the other hand, other articles have move one or move two missing especially move one that was absent in article (three (3), five (5), six (6), ten (10), twelve (12), and fourteen (14). The results of the corpus disagree with the one of Hyland (2000) who found move one in 95% of 800 articles he analysed. Surprisingly, the missing moves were not added

after the review procedure. Through the divergent structures expressed in writing the abstracts, we understand that our researchers are at grip with the necessary skills and capacities that empower them to establish the context for their studies and identify their aims.

Second, when moving to the introduction section, we have first to remember that it is realized through three main moves: establishing a topic in which literature is reviewed, preparing for the study by indicating a gap or raising a question, and introducing the study by stating the purpose, describing procedures, presenting finding, and indicating the paper structure which is restricted to some fields. Unlike swales (1990, 2004; Samraj, 2005, Kanoksilapatham, 2005, 2007), move two is not found in half of the corpus; the introductions are displayed in move one and move three that are present in all the sections. In fact, Kanoksilapatham (2007) considers move two as an obligatory move that establishes the link between the first and the third moves. Therefore, researchers are unable to view the link between the two moves by justifying the necessity of conducting the research (Swales, 2004).

In line with the findings of Peacock (2011), Kanoksilapatham (2007), Lim (2006), Nwogu (1997), the methodology first three moves follow the international conventions. According to Kanoksilapatham (2007) move one and move two are obligatory moves. Through the articles analysis, move one and move three were found in all the articles. Conversely, move three is considered as an optional move because it was found just in 10% of the whole corpus of 60 articles (Kanoksilapatham, 2007). The same holds true for our corpus, move three was just found in article two (02) and three. Moreover, move four was present in article (one (1), three (3), five (5), six (6), eight (8), ten (10), eleven (11), twelve (12), thirteen (13), and fourteen (14). The result is in accordance with Peacock (2011) who identified this move in 228 articles from 8 (eight) different disciplines, yet move four is considered as optional by Kanoksilapatham (2007) who found it in 13% of the corpus. On the whole, the researchers have shown a high level of awareness about the rhetorical structure of the methodology section through respecting the international conventions; a possible interpretation of the positive results is the scant attention given in literature to this section in comparison to other sections like the introduction and the discussion.

The fourth section is the results section. Models derived from literature (Kanoksilapatham, 2007; Thompson, 1993) suggest four moves to write the results section namely: restating methodological issues, justifying methodological issues referring to previous literature, announcing results, and commenting results. On the other position, analysis of moves and steps in results sections of the corpus demonstrated that the first move was strongly present in all the articles; nevertheless, move two was absent in article (six (6), seven (7), eight (8), ten (10), eleven (11), twelve (12), thirteen (13), fourteen (14), and fifteen (15) and added to the final version to article (one (1) and five (5) while move four was absent in article (two (02), five (5), seven (7), and eight (8). As a matter of fact, move two and four are considered by Kanoksilapatham as obligatory moves as move two was found in 71% of the corpus while move four was found in 91% of the corpus of his study; moreover, Thompson (1993) found move two in 93% of his corpus.

Differently from move two and move four, move three proved presence in all the articles using all steps ; move three results again justifies the findings of Nwogu (1997), Thompson (1993), and Kanoksilapatham (2005, 2007) who consider findings announcement as an obligatory move in the results section . Accordingly, the analysis results indicate that our researchers have difficulties in justifying their methodological choices relying on previous literature and commenting their results. Move two and move four are built on arguments; however, arguing is one of the most serious problems NNs suffer from when writing research. Moreno, Rocha, Burgess,Lopez-Navarro,& SAchdev (2012) claim that the lack of critical attitude transfers to the rhetorical structure of writings in English which causes problems in the publication process.

A large part of research was devoted to the discussion section; it is considered as the most difficult section to write. Models from previous literature agree on four main moves for the realization of the discussion namely: contextualizing the study, consolidating results, stating limitations, and suggesting further results. Similar to Holmes, 1997; Peacock, 2011; Ruiying and Allison, 2003; Kanoksilapatham, 2005, 2007 models in which consolidating results is an obligatory move, the results of the analysis indicated the presence of move two in the entire corpus. However, move one was absent in article (one (1), two (2), ten (10), eleven (11), twelve (12), thirteen (13), fifteen (15). Move three and four were absent in all the sections except the one in article eleven (11). For the last two moves, Swales and Feak (1994) consider limitations

of the study and suggestions for further research as optional moves while Ruiying and Allison (2003) categorize them with the moves of the conclusion section, yet the results approves that the discussion section presents a real difficulty for research writer; it seems that researchers believe that the discussion is about the second move in which they directly go to stating selected findings.

The last section in our analysis is the conclusion. Ruing and Allison (2003) suggest four moves: summarizing the study; evaluating the study under which we have three steps: indicating significance, indicating limitations, and evaluating methodology. The last move is deductions from the research; the latter can be realized by suggesting further research or drawing pedagogical implications. The analysis of the corpus showed that move one was absent in three articles and added in the fourth article after the review. Move two was realized through step one and three, and move three was absent in article (two (2), three (3), six (6), eight (8), fourteen (14), and fifteen (15). The findings demonstrate the absence of the limitations of the study and suggestions for further research in the conclusions. Interestingly, limitations of the study was suggested in the results section, the discussion section, and the conclusion section, yet at the end of our analysis we found out that this communicative purposes either in a form of a step or a move was not realized by our researchers.

Another important point in the analysis is the modifications brought by reviewers. Throughout the analysis of our corpus covering both the first and the final versions in each article, we noticed that the analysis of the first versions proved the absence of highly important communicative purposes like indicating a gap in research in the introduction and justifying methodological issues in the results section. Similarly, the revisions brought by reviewers are revolutionary in terms of the structure. Generally speaking, the modifications that were undertaken by researchers after the review procedure are summarized in adding more vital steps realizing moves, replacing some steps with more important ones, or addition of moves. The sections that received more modifications are the methodology and results sections due to their important role in facilitating research replication.

5.4 Reviewers' Reports Thematic Analysis

The analysis of the reviewers' reports is targeted at eliciting the main changes reviewers recommend at the rhetorical level of the submitted manuscripts. Thematic analysis was carried on the reports to categorize comments.

Category1: Comments about the structure of the abstract

Reviewers in commenting the abstract asked for removing the first part of topic establishment and research gap to the introduction. As a case in point, reviewer **5B** wrote: "Lines 8 to 11 should go to introduction part"

Whereas the reviewer in report **9A** asked for stating major findings: "Abstract needs data oriented which should reflect the major findings"

Seemingly, the reviewers recommended key changes in the abstract; establishing the topic and research gap are fundamental moves in the introduction which justifies the comment. Stating findings is also considered as a major move that have to be added to the abstract.

Category2: Comments about the structure of the introduction

The comments concerning the introduction turn around the scantiness of significant references in the review of literature, problems in establishing the topic, and the absence of the statement of the aim in the introduction. As a case in point, the reviewer in report **1A** commented the lack of references and topic establishing: "General state of the art is not well developed. However some references to works that deal with the different approaches used in landslide susceptibility mapping should be done"

Reviewer in report **2B** added about the deficiency in reviewing previous literature: "Please add some mapping works done in this area or in its neithboring such as " Athmania, D., & Achour, H. (2014)…methods and analysis. Journal of Water and Land Development, 37(1), 39-48."

Moreover, in report **A1**, the reviewer suggested: "Include some references about TWI and SPI factors such as (Moore et al. 1991)" and in report **13A** he said:" In the introduction part, please add something about LR model and give some references as the paper is based on the LR model"

The reviewer in report **10B** advocated putting the aim of the study at the end of the introduction: "Usually aim of the study wrote in the introduction and before material and methods ", and in report **10A**, the reviewer commented putting the statement of the aim in the methodology section:" Need no goals in Methods and materials". In report **5A** the reviewer suggested putting the aim of the study at the end of the introduction instead of stating findings: "At end of introduction, kindly add aim of work rather than results", and in report **7B**, the reviewer approved adding more details to the introduction about the research procedure and objectives:"The introduction should better explain the existing methods, and how this research contributes. It should also better explain the objectives and methods used".

The previous quotations reveal that Sciences teachers have problems in realizing the first communicative purpose of the introduction, introducing the topic. The reviewers commented the scant background to support the topics under study and criticized the statement of the topic. For the last part of the introduction, stating the aim is considered as a crucial step in the introduction, yet teachers have received considerable number of comments especially about its place.

Category3: Comments about the structure of the methodology section

The methodology section received the largest share of comments from reviewers; they are mostly about the insufficient details about experimental procedures, statistical procedures, the sample or subjects, tools, methods, references to support methodology choices, and suggestions for improving the methodology. For instance, in report **3D** the reviewer is asking for clarification about number of subjects in the sample and the research tool adopted in the experiment: " It is not clear either how many mice in total make up the casuistry so it is very difficult to rely on the statistical results".

The reviewer in report **9A** criticized the lack of details about the subjects and the statistical procedures: "Material Method-Does not contain name of weed species evaluated, statistical method used needs to be mentioned". Moreover, in report **5A**, the reviewer requested more details about the sample and experimental procedures: "Please add compound physical characters, weight of compound, TLC system used for isolation and purification and spray reagents (if any) used. 8. Line 186. How they protect oxidative disease?"

While the reviewer in report **7A** suggested for the methodology perfection: “Precipitation records, could have been used to analyze the relation with landslide occurrence dates, and to establish frequency classes of landslides”

Then he questioned details about analysis, subject, and experiment:

“The analysis of the historical landslides should be carried out with much more detail”

“Please detail more between rotational, planar and compound landslides”

“-add a methodological flow chart for describing the adopted method”.

In report **1A**, the reviewer sought clarification about the experimental procedure: “9- p. 10, lines 3-4: I do not understand the meaning of “If there are two (02) dependent variables, the curve can be drawn using the predicted dependent variables through statistical models.”

Then he recommended supporting the methodology section with references: “5- p. 8, line 10: “multi-steps interpolation” needs a reference

“2- p. 5, line 9: Flow direction factor needs a reference”

Furthermore, in report **13B**, the reviewer demanded supportive references about setting and methods: “As the author used logistic regression for assessment of slope movement, it is better to cite some papers which use the same method for analysis in different parts of world”.

In addition, the reviewers in report **11B** asked for detailing the experimental procedure and statistical analysis: “*How* the “DIPS V.5.1” software is used for joint sets for the stability analysis?”

“How raw data has been introduced in the software?”

Then he asked for supporting the methodology with references: “Author wrote that 'In this analysis, a safety factor of 1.3 was used as the limit between the stability and instability'. He didn't give any references”. Finally, report **B3** poses questions concerning the lack of details concerning the sample, experimental procedures, and statistical analysis: “It should be mentioned about which part of the plant was used in this experiment”

“- Which formula is used to calculate %scavenging?”

The methodology section presents a large space for reviewers' comments; they are asking for detailed explanation of the experimental and statistical procedures; furthermore, they recommend a detailed description of the sample or subjects used in the studies.

Category 4: Comments about the structure of the results and discussion section

The comments about the results and discussion sections were chiefly addressed to manuscripts in which both parts are written in one section. The comments are about detailing, commenting, and evaluating the results, justifying methodological choices, replacing tables with texts, poor discussion, and lack of comparison with previous literature. As an illustration, reviewer in report **B3**, asked about missing results: "The IC50 value of luteolin-7-O-glucoside (4.28 µg/ml) is better than of SCPE (8.02 µg/ml) and similar to that of trolox. How about BHA, & BHT?" The reviewer in report **D5**recommended critical evaluation of result*s:* Some critical evaluation of results is needed in the results and discussion part" In report A2: "A lot of information lost after this processing!!!. Please correct" The reviewer in report **B5** questioned the missing details: "table 1, values for hexane extract are missing and that for aqueous extract were not added"

In report **11A**, the reviewer suggested:" the conversion of the data of the tables 2 and 3 in the text form", but in report 1A, the reviewer asked for comments about what was stated: "By considering landslide triggering factors, this work is more like a hazard mapping rather than a susceptibility mapping (van Westen, et al., 2008; Nadim et al., 2008; Fell et al., 2008).Make comments"

For the discussion, in report 5A, the reviewer criticised the insufficient discussion: "The discussion is very brief being a work of basic science"While in report **10B** and report **13B**, the reviewers criticized the brief discussion: "Practically absent part "Discussion". In this respect, the manuscript must be strengthened". "The author can refer other papers that use the same methodology for assessment and compare their results with the present study*"* Whereas in report **3C**, the reviewer reported about the discussion: "The manuscript needs to be revised completely and the discussion and to support more its results from literature"

The findings in this category show that Sciences teachers are receiving comments about detailing and commenting results. More importantly, the reviewers are stressing the need for strengthening the discussion section by evaluating results and referring to previous literature for comparing their findings with those obtained in previous studies.

Category 5: Comments about the structure of the Conclusion

The comments about the conclusion are not detailed; they involve removing non-significant parts. In report **11B**, the reviewer commented: "In your Conclusion portion a major changes is require" while in report **2B**, another reviewer said: "The author stated that "This study gives new information …….what where exactly the new discovered lithological units? Please correct or delate (sic) this sentence". In report **A1**, the reviewer added: "p. 13, line 5: Too long, not useful"

The passages that were subject to removal of reviewers were repeating information already mentioned in previous sections like the case with article eleven (11) repeating the limitations and suggestions for further research after realising them in the discussion. Article one provided a detailed description of the study at the beginning of the conclusion

Category6: Comments about the bibliography section

The manuscripts received comments about the bibliography section; they are typically about respecting the journals guidelines, missing to mention references, and Short bibliographies.

For instance, in report 1A the reviewers wrote about missing refrences: "1- p. 3, line 4: The reference "Bourenane 2016" is not found in the reference list", and in report 11A:"Line 154 please added the reference of (Trunck and Hönisch, 1989) in the reference list"

For respecting the guidelines, The reviewer in **2A** wrote; "make your references in accordance with the journal style", and in **A14**, the reviewer commented:" These are not according to Pak Vet J; Visit our website for correct format; while in **11A**, the reviewer advocated revisions: "The references list should be written according to the style of Mining Science journal; please follow the instructions for Authors"

In report **5B**, the reviewer raised a technical problem in writing references: "In references part, journal names should be abbreviated and plant names should be italic. Correct please" While in 5A, the reviewer criticized the short list of references: "Very reduced bibliography…"

For the short list, it is recommended in **2A** to" Add more references of 2011-2012 (30%) from published papers", and in 11A: "Line 118 please expand the bibliography by significant papers such (Hook et al. 1995)"

Category 7: Comments about the writing language

Reviewers in the reports agreed on commenting language mistakes like grammatical and spelling mistakes and technical problems like mistakes in abbreviations and the lack of their meaning recommending refinement. For example, in report **3B** the reviewer highlighted the mistakes with providing correction:

"Line 152 the reducing tive ability"

"Line 175 ...and trolox. Luteolin-7-O-glucoside exhibited potent"

In article **1A**, the reviewer wrote about the grammatical mistakes: "The following lists some examples of grammatical errors: p. 2, lines 6-7:"The study database was compiled…". Delete study"

"p. 2, line 12: "That slope gradient…". The slope gradient"

The reviewer in report **7A** called for language revision: "First of all, English. I'm not a native speaker, by I can clearly see that the level of English grammar and syntax is medium"

"Title: there is a spelling mistake in the title: Please correct the title or change it"

Another case is report **6A** correcting grammar mistakes: "1-Page 2 line 57: rewrite "the" to be as "at the". 2-Page 2 line 73: rewrite "tests" to be as "testes"

In report 9B, the reviewer commented the language: "There are lot of grammatical errors and unclear sentences" and in report **4A**, the reviewer evaluated the paper:" The weak point of this paper is the numerous grammatical and spelling mistakes, which require more work and perfection. As it is now, it needs **moderate revision".**

Finally, in report **13A** and **13B**, the reviewers recommended language refinement: "The authors need to improve the English writing style as there are many grammatical and spelling errors in the manuscript", "The language has to be improved in the manuscript"

The titles of manuscripts received comments that differ between modification and change. In report9A, the reviewer suggested modification: “Topic- Better to write weed seeds of species rather weeds seeds as written in topic” While reviewer **9B** recommended changing the topic: “The topic should be changed as “Germination, production and morphological characteristics of weed seeds belonging to family Poaceae in Setif, Algeria”. In report **13B**, the reviewer also recommended changing the title:

“The title should be “Study of slope failures characteristics and slope movement susceptibility assessment using GIS in a medium scale: ……."

In report **4A and 7B**, the reviewer asked for title revision: “The Title can be revised to project the used methodology with the study area.

The reviewer in report **6A** suggested modifying the title: “The article is focused only on the Male Fertility parameters, either change the topic or add some more parameters for Female Fertility” and in report **11A** and **11B**: “I suggest to modify the title of the manuscript to "Evaluation of rock massif stability with a neo-combined approach, case of Jebel Gustar aggregates career, Setif province NE Algeria", “Title of the paper should be change. It would be like " Slope Stability Analysis In Open Pit Mines Of Jebel Gustar Career, Ne Algeria - A Multi-Steps Approach".

5.5 Discussion of Reviewers’ Reports Analysis

To answer the third research question: What changes at the rhetorical level do reviewers reports bring to submitted research articles? Thematic analysis took place on reviewers’ reports coming out with eight main categories about the structure of the articles’ different sections.

First, the reviewers commented the abstract section. They first recommended findings’ statement in the abstract. The remark goes along with many scholars who identified the main moves of abstract Salvager –Meyer, 1990; Bhatia, 1994; Dos Santos, 1996 & Hyland, 2000); they all agreed that stating major findings is a conventional move in the abstract. On the other hand, a reviewer asked for removing the topic establishment and research gap to the introduction. The request strongly agrees with Swales model (2004) in which topic establishing was the first move in the introduction to contextualize the study and provide solid background of previous literature; while the research gap is the second obligatory move in the introduction

The second category of comments was addressed to the structure of the introduction. The reviewers' comments were basically about the third move of the introduction section. The step of stating the aim of the research study was not clearly identified or misplaced. Following the model of Swales (2004), the aim of the study is the only obligatory step in realizing the third move. Therefore, the reviewers' recommendations agreed with studies in previous literature. Interestingly, the reviewers stressed commenting the first part in the introduction; comments highlighted missing significant works in the review of literature to provide a rigid background to the works. Conversely, establishing the topic move is a supreme move in the introduction; it is mainly realized through referring to previous literature (Swales, 1990, 2004; Kanoksilapatham, 2005, 2007) to present the work as part of a continuous procedure. .

The third category of comments was about the structure of the methodology section. The reviewers criticized the scant details concerning the sample or subjects in the studies, lack of details about the tools used or methods adopted in carrying the studies, insufficient details about the experimental and statistical procedures, and missing references supporting methodological choices. The comments are in accordance with models developed in literature by (Nwogu, 1997; Peacock, 2011; Konoksilapatham, 2007; Lim, 2006) who believe that details about the sample and experimental procedure are obligatory moves in building the methodology section as they allow work replication. The lack of details about the three moves in literature: Describing materials, sample/ subjects, Describing experimental procedures suggests that Sciences teachers are unaware of the role the methodology section plays in a research papers through its main moves and steps.

Next category of comments is concerned with commenting the structure of the results and discussion sections. The comments of reviewers shed light on the undersupply of details about the findings, requested evaluation and comments of results, and recommended methodological justifications. Similarly, models in literature stress justifying methodological issues as a second move in the results section, reporting and commenting results as steps of the third move, Announcing Results, and evaluating results as the third step in the fourth move, commenting results(Thompson, 1993). Thereupon, the comments of the reviewers implicitly clarify the rhetorical difficulties Sciences teachers have in writing this section. On the other side, comments about the discussion are not detailed; they are summarized in criticizing the space given to the

introduction as being brief or poor, or recommending comparison with previous literature. Those comments justify the number of studies devoted to this section (Dudley-Evans, 1994; Swales and Feak, 1994; Holmes, 1997; Nwogu, 1997; Peacock, 2002; Kanoksilapatham, 2005; 2007) as being the most difficult one to write in the article.

Moving to the conclusion section and bibliography section, a little has been said about the conclusion section. Similar to literature (Ruiying and Allison, 2003), the reviewers are accepting short conclusions involving the three moves of this section. For the bibliography section, they are stressing the respect of the journals guidelines which is considered as an important aspect that reviewers should assess (Robetrts,Coverdal,Edenharder,& Louie,2004; Spigt and Arts, 2010; Wincka, Fonsecab, Azevedob, &Wedzicha, 2011; Bornmann ,Weymuth , Daniel; 2010).

The last category is concerned with language of writing. In the reviewers' reports, a moderate share was given to comments about the language of the manuscripts. The remarks are about grammatical mistakes, spelling mistakes, unclear sentences, and modifications addressed mainly the titles' language. Writers of the manuscripts are asked to revise their papers referring to native speakers, and titles were subject to modifications or radical change. Those results are in accordance with Hames (2007) who states that a primary focus of the reviewer should be providing objective and constructive remarks about the language, while Flowerdew (1999) showed that scholars have problems related to grammar and structure of texts as the first top problems in writing RA.

On the whole, comments of the reviewers are related to the rhetorical structure of the manuscripts' different section. Sciences teachers seem to have problems in providing solid background to their research by citing significant references, unaware of justifying their methodological choices by referring to literature, missing to provide detailed description of their methodological procedures to allow replication of their works, unable to discuss their results thoroughly by evaluating their findings and comparing them to previous literature findings. Moreover, they are struggling with the international language of research writing. The results of both RAs analysis and reviewers' reports confirm the first and the last hypothesis. Awareness and application of research writing international conventions reduces the amount of reviewers' comments and difficulties in writing RAs.

5.6 Synthesis of the Main Research Findings

Through opting for three main research tools namely a questionnaire, interview and document analysis, the present study sought to answer three research questions and three Hypotheses:

Q1.What are the rhetorical difficulties the Sétif University Sciences teachers face when writing research for publication?

Q2. What strategies do Sétif University Sciences' teachers use when writing for scholarly publication?

Q3. What changes at the rhetorical level do reviewers' reports bring to submitted research articles?

1. In addition to scientific values, awareness and application of research articles' generic conventions are indispensable in the writing for publication process.

2. Adopting strategies during the process of writing may alleviate the challenges novice researchers may face when seeking membership in the academic community

3. Following research writing international conventions may reduce reviewers' remarks about RAs structure.

The obtained data from each tool can answer more than one question at the same time. Though the main aim of the questionnaire was not unswerving the first research question, the participants showed varied levels of difficulty in realising some communicative purposes like in the discussion section. Moves analysis of research articles in their original and final versions was intended to answer the first question. The analysis revealed that teachers have problems in writing different sections of the articles through missing to realise obligatory moves in sections like the abstract, the introduction, results, and the discussion. Moreover, the reviewers' reports amplified those findings by highly stressing the lack of details of steps in the methodology and results sections. They criticised the poor discussions and the realisation of the first move of the introduction as the teachers failed to provide solid background to their studies through referring to previous literature.

For the awareness of the Sciences teachers about the rhetorical structure of research articles, the questionnaire findings proved that the level of awareness is high, yet in some cases they mix up between the communicative purposes devoted to each section. They believe that a description of the source of materials and limitations of the study are to be included in the introduction; findings are consolidated in the results section, statistical procedures are presented in the conclusion; and they do not feel a necessity to restate methodological issues in the results section. Moreover, in analysing the reviewers' reports, we noticed through the comments addressed to writers that there is a problem in the awareness about the rhetorical structure of the different sections in the research article. For instance, the reviewers highlighted the problem of placing the aim of the study in methodology section instead of the end of the introduction; they also recommended providing more literature review in the introduction. For the methodology section, the reviewers' reports requested details about experimental procedures, details about the samples, and justifications for methodological choices by referring to literature knowing that those last notions are fundamental moves in the methodology section. The comments about the discussion section were not detailed, yet the idea of strengthening the discussion suggests the absence of vital moves in this part.

Then the analysis of the articles with reference to the models developed in literature showed that Sciences teachers are to a moderate extent respecting the international conventions of research writing. Interestingly, teachers have problems in realising moves in which arguments are needed like justifying choices of methodology, evaluating, commenting, and comparing their findings with the one obtained in previous literature. In fact, the teachers declared in the interview that they have problems with the discussion section because they need to explain, argue, and prove the significance of the study findings through language. They indicated that the problem lies in the language and the structure of the discussion. They also stated that reviewers' reports about their articles are mainly requesting more details in the different sections.

The second research question is about the strategies Sétif University Sciences' teachers use when writing research for publication. The participants in the interview stated that for overcoming the different difficulties they have in writing research articles, they seek help from their colleagues, supervisors, language specialists. The shapers of the article with the main author provide guidelines at the scientific, structural, and linguistic levels. The second dominant strategy is modeling published articles in which teachers refer to imitating the structure of

research articles they have already read; they even borrow expressions from them. The third strategy that participants revealed was referring to the mother tongue or the instructional language in writing their manuscripts. They explained that after writing the first draft of the article, they translate it to English. The last strategy that raised a problem for reviewers is using the technical language; teachers indicated in the interview that what makes the results and the methodology sections easy to write is the use of tables and graphs, yet the reviewers at many occasions asked for replacing tables with texts.

The last research question was about the main revisions the reviewers' reports brought to the submitted manuscripts. Supporting the details obtained from the interviews and the articles' analysis, the reports exhibited that the main problem with Sciences teachers is the scant details about major procedures in the research studies like experimental procedures, statistical procedures and findings reports. The analysis of the articles stressed many revisions by adding steps to moves after revision. The other problem that was raised is the small passage given to the findings comments, evaluation, and discussion. Logically speaking, the discussion is the area where the researcher covers all the aspects of his study, proves its significance, and the validity of its results. However, the reviewers' reports indicated that this section was neglected by writers while the manuscripts moves analysis revealed the absence of major communicative purposes in many articles like contextualizing the study.

To conclude with, our study has succeeded in eliciting serious rhetorical difficulties on the part of research writers that may prevent them from publishing their articles in highly prestigious journals or may cost them time as they need to revise and submit their manuscripts many times. It has also shed light on the strategies Sciences teachers at the University of Sétif apply to face their dilemma, yet when using those strategies, researchers need more awareness about international conventions of writing for research publication purposes. Thus, the results confirm the three hypotheses raised above.

5.7 Conclusion

Chapter five was complimentary to the previous chapter as it presented the second stage of the research study and provided accurate data about the previous chapter claims. Differently from what was obtained in the previous chapter as participants showed a high level of awareness about the rhetorical structure of research articles, the present chapter findings revealed that Sciences teachers have a considerable level of difficulty in organizing their research articles; fundamental moves and steps were absent in their articles.

On their turn, reviewers' reports supported the research articles move analysis results. The reviewers were addressing serious remarks concerning the structure of the manuscripts specially the discussion section. Comments also recommended modifications in moves order and asked for detailed description of methodological issues. In light of those findings, the next chapter will be devoted to presenting implications and recommendations to the research process different participants, research management, research production and publication like policy makers, Academic institutions, course designers, instructors, mentors, reviewers, and supervisors.

Chapter Six

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Chapter Six: Pedagogical Implications and Recommendations

Chapter Six

Pedagogical Implications and Recommendations

6.1 Introduction

Writing for publication in international journals, by definition in English, has become a high-stake and indispensable requirement for promotion or graduation for both native and NNs researchers all over the world. However, NNs researchers struggle to craft their manuscripts and get accepted and recognized in the scientific community. They are at a discoursal disadvantage in comparison to native speakers of English. Ergo, the striving impetus behind advocating this study is to investigate Sétif sciences researchers' structural organization difficulties in writing for scholarly publication and strategies used to surpass those difficulties.

Prior to the review of literature and the discussion of the results in the previous chapters, a plethora of pedagogical implications are suggested. Policy makers and institutions are provided with ideas to invest in research publication area. Course designers, mentors, textbook designers and research writers are presented with procedures to minimize the problem of research writing. Moreover, reviewers are supplied with a checklist to facilitate their mission of evaluating articles in which the main criteria of a conventional RA are detailed. The chapter also presents a tentative syllabus for instructors to cover both the structural and linguistic aspects of research writing along with a detailed example of one week presentation. Finally, research limitations advocate further research area to be covered. The following implications are specific to, but not limited to the context of Sétif sciences' teachers.

6.2 Implications for Policy Makers

It is worth to know that the English proficiency of sciences branches' students significantly decreases during their graduation from MA and PhD studies because they receive few lectures in English that are barely related to their subject area; students rarely have courses in academic writing or research writing, and this discontinuity led to more difficulties for NNs novice scholars. Thereupon, policy makers are called to reflect on the language policies for PhD Programs. For instance, writing centers can be established to provide consultation and academic research writing courses by experts. Practices of involving novice researchers in research writing and dissemination are to be financially encouraged.

Actually, policy makers can invest in the area of writing for publication purposes by rewarding researchers who succeed in publishing their articles in prestigious journals or allocate more funding to researchers to attend international conferences and seminars that end in publishing in international journals. Such operations will automatically lead to improving the universities ranks and the country shares in the international market of research. Etiam, doctoral researchers can benefit from programs or extensive trainings during their graduation about research writing, editing and reviewing procedures, the concepts of indexing and impact factors to be integrated in the academia community.

6.3 Implications for Academic Institutions

Academic institutions in higher education are the backbone of research writing promotion procedure. Their role can be very effective if they amplify varied forms of support to promote writing for research publication. For instance, peer-mentorship is one of the available choices through which professors and supervisors' workload can be lessened. More experienced research writers can provide significant help to novice ones especially that learning from peers proved to be more fruitful. Actually, through peer-mentorship, sciences teachers at the University of Sétif can collaborate, exchange experiences, and why not publish joint works. In fact, The results of the interview of this study divulged that one of the most helpful and successful strategies used in writing RAs is seeking assistance from colleagues that have already had the experience of publication.

The second option that institutions may adopt is organizing seminars or workshops about research writing with continuous mechanisms focusing on the publication process as it starts by writing the manuscript, reviewing procedure, correction of manuscripts, and the last stage of publication. It should also stress the RA components, jargon, rhetorical structure, and provide guidelines for publishing projects. All those concepts are to be facilitated by faculty members, reviewers of acknowledged journals, or sciences teachers that are experienced in research writing. Along the same line, the institutions need to recruit writing experts who are trained in the subject area to meet the needs of novice researchers as the interview participants explained that when writing research, the only role language specialists can play is providing editing.

6.4 Implications for Course Designers

Checking textbooks about teaching writing for research publications to adopt in teaching yields in cardinal works like (Swales and Feak, 1994).This book is produced out of research and teaching experience to help graduate students with their academic writing following move analysis principles. The textbook is composed of units in which the organization or the different moves of the different sections of RA are presented with some specific focus on grammar. Learners are supposed to analyze, write, and organize the different sections in a research paper to be equipped with the necessary linguistic and structural skills to write research. Similarly, course designers and ESP/EAP practitioners are expected to:

6.4.1 Analyze the needs of the participants in the courses.

The analysis of the questionnaire, reviewers' reports, and RAs data calls for an urgent comprehensive analysis of the doctoral students and novices researchers' needs in academic writing and writing for research publication purposes at the Faculty of Sciences in Sétif University. In fact, the results proved a lack of awareness about the obligatory moves of a RA and a serious problem of language which can be considered as partial data for needs analysis, yet the analysis of needs will collect more information about both the struggles in terms of language and the rhetorical structure of RAs. Needs analysis will provide a clear vision about the struggles those researchers face and build a solid background for an effective course.

Besides, analyzing the needs will help in selecting the appropriate authentic materials and setting objectives. Writing for publication for NNs researchers may be blocked by many obstacles like linguistic challenges or grammar, discoursal challenges like textual organization, relating text to audience, hedging to indicate caution expected by the academic community, ways in which to make knowledge claims, or non discoursal one like anxiety, cultural background, and corresponding with reviewers and editors. Consequently, the objectives of the course will be identified according to the needs analysis results.

6.4.2 Develop research writing courses for science students.

The majority of the students in scientific branches are supposed to write research for graduation purposes. On the other hand, students in all their graduation years study English as a foreign language, yet the content is generally grammar and vocabulary acquisition based. This reality urges course designers and practitioners to develop courses or activities that aim at writing research in English. Meanwhile, they can refer to textbooks, models, and studies that may help them. Approaching the structure of RAs is a useful and motivating experience for post graduate sciences students than any other kind of courses as they get equipped with analytical, critical, and linguistic skills.

Moreover, course designers should be aware of the disciplinary differences when designing courses for sciences researchers and raise their awareness to those differences. In other words, writing research for social and human sciences is different from medical sciences, and the latter is different from writing for publication in Physics and Biology. Ergo, the course designer should be careful about those details when designing courses, choosing materials, and setting objectives.

6.4.3 Design courses based on models in literature.

When talking about courses presented in trainings or university classrooms about writing RAs, we think of theoretical lectures turning around rules of dos and don’ts, yet instructors can present their courses inspired by models of moves analysis that are presented in literature. The role of those models is raising the researchers’ awareness of the RA different sections’ conventional rhetorical structure; it does not just help in creating proficient academic writers but also proficient readers that are able to analyze and identify the objective of each section in the

articles they read. Relying on the templates derived from literature facilitates the job of novice researchers in founding RAs that conform to the conventions of the DC. Models are generally derived from successfully published articles in prestigious journals which give them credibility to represent the conventional structure of RAs.

6.5 Implications for Researcher Writers

The gap between disciplinary experts and language experts is one of the most perceivable obstacles when trying to design courses for novice research writers. Therefore, Interdisciplinary collaboration is one of effective solutions for this dilemma. By developing interdisciplinary collaboration, we call for the linguistic competence of the language expert to join the scientific expertise of the scientist. Actually, sciences teachers relation to language specialists is summarised in their editing of language errors in the manuscripts, yet through their collaboration, language specialists are supposed to move to a higher level in which scientific discourse is analysed; they are expected to identify the main linguistic and structural characteristics of scientific discourse to be able to provide reliable feedback for researchers in sciences.

At the personal level, research writers have to look for alternative mechanisms to bridge the gap between their research area and the language and structure of RAs. In the researcher personal experience, working on moves analysis in both MA dissertation and PhD thesis taught him how to write and structure the different sections of a RA or a dissertation. Following the different models in writing and analyzing the papers facilitated the mission of writing. Ergo, novice scholars aiming at publication in English-only high profile journals should be aware of the international conventions of RAs writing and informed by the concerns and demands of peer reviewers for manuscripts in their field.

6.6 Implications for Reviewers

Through the analysis of the reviewers' reports, we noticed that the reports do not follow one standard form. Instead, some reviewers in indexed journals in Scopus refer to writing their remarks in irregular order, and they mix between remarks that are related to language and the ones that are related the articles' content. Therefore, the present study provides a detailed description of the review procedure along with an adapted checklist that reviewers can refer to in

order to assess manuscripts' quality. The checklist was the results of frameworks analysis from Robetrts,Coverdal,Edenharder,& Louie,2004; Spigt and Arts, 2010; Wincka, Fonsecab, Azevedob, &Wedzicha, 2011; Bornmann ,Weymuth , Daniel; 2010). It is intended to evaluate the manuscripts in terms of structure, language, and content. The checklist can be an effective aid for novice reviewers as it determines the main criteria to be assessed during the evaluation of a manuscript; moreover, being based on the general structural guidelines of manuscripts evaluation, the checklist can be used for both hard and social sciences .

Table 6.1

Checklist for Reviewers

Originality of the work	The work should have some original aspects like the questions it answers, the methods used, or any controversies it sheds light on.
Relevance	The paper should be relevant to the journal scope. The study addresses important, new issues and add new perspectives to the existing literature
Research questions and problem statement	The problem statement should be clear and concise The research questions should be relevant and complete
Research Design	It should be appropriate, well described, adequate, and plausible It should have internal and external validity
Instrumentation, data, and population	They should be clearly describe, appropriate to the research design

Statistics and data analysis	Data analysis should be well described, appropriate to the research design. Qualitative research should be based on words Data in qualitative research should be reliable, valid, and empty of bias
Literature review	The review should be of convenient references, includes analysis and critique, and well integrated The references should be up to date and the number should be acceptable
Discussion of results	The results should be properly interpreted The flow of ideas should be logical Important points in discussion should be highlighted
Ethical issues	Ethical problems are identified The work should be compatible with ethics of research
Clarity of the paper	The paper should be well structured Format of texts, figures, and tables should be carefully chosen to present data The logical flow of ideas and arguments should be respected The paper should follow the journal guidelines in terms of structure All the article sections should be complete and comprehensible

6.7 Implications for Mentors

As a reaction to doctoral students and researchers claims about the difficulties in writing RAs, many universities, research centers, and academic schools attempt to organize short term trainings in order to help those researchers. Therefore, it is important for mentors to train their candidates to use strategies in writing RAs. Researchers and practitioners apply some strategies in order to write research, yet using those strategies without being aware of their inconveniences may create some troubles to their novice users like the problem of plagiarism when trying to follow already published articles, excessive use of technical language to avoid committing grammatical mistakes, or seeking help from language specialists who may distort the scientific value of the work.

6.8 Implications for Supervisors or Co-authors

Supervisors as shapers of their candidates' manuscripts play an important role in guiding them. Generally, supervisors are experienced researchers in the field of publication especially in applied sciences. Thus, their role is vital as supervisors and co- authors. They can provide guidance for their candidates in designing research, editing the manuscript language, manuscripts structure. They can similarly play the role of the reviewer of the manuscript before submission.

6.9 Implications for Textbook Designers

In the journey of seeking a textbook that may help in achieving scientific publication, mentors or research writers may find textbooks that are taking the form of guidelines about the procedure of writing. However, those guidelines are standard without taking any consideration to the linguistic or cultural background of the researchers or the mentor. Accordingly, following those guidelines does not mean automatically success in publishing. The textbook designer should take into account the linguistic abilities and the cultural background of the textbook uses.

6.10 Implications for Instructors

After conducting the present study and discovering the challenges research writers face to structure their manuscripts and dealing with textbooks like Swales and Feak, 2004; Weissberg & Buker, 1990; McCarthy& O'Dell, 2008; Wallwork, 2011, we came with a tentative course

syllabus. The course is presented in fifteen (15) weeks sessions. As the table demonstrates below, the first week is aimed at introducing research writing as an academic genre to the students focusing on coherence as a vital pillar in academic writing. Next, the thirteen left weeks are mainly focused on explaining the rhetorical structure of the RA sections (Abstract, Introduction, Methods, Results, Discussion, and Conclusion).

Actually, each section needs two (02) weeks as the instructor is supposed to present the rhetorical organization of the section in the first week along with the practice aiming at socializing the students with the different moves and steps. Then, in the second week, the focus is moved to the linguistic features of the section and the collocations that can be used in writing. Finally, the student is expected to write the first draft of each section preparing to write the final draft of a whole article for the objective of publication.

Table 6.2

Tentative Course Syllabus

Week	**Content**	**Assignment**
1	Research Writing Language focus: text coherence	
2	Abstract: Rhetorical structure	Analyzing articles 'abstracts
3	Abstract: Language focus: Academic vocabulary	Abstract draft
4	Introduction: rhetorical Structure	Analyzing articles' introductions
5	Introduction: Language focus: Academic vocabulary	Introduction draft 1
6	Introduction: Plagiarism and paraphrasing	Introduction draft 2
7	Methods: rhetorical Structure	Analyzing articles' methods sections

8	Methods: Language focus: Academic vocabulary	Methods section draft
9	Results: Rhetorical Structure	Analyzing articles' results sections
10	Results: Language focus: Academic vocabulary on describing graphs, presenting findings	Results draft 1 In-class exercise: graph commentary
11	Discussion: Rhetorical Structure	Analyzing articles' discussion sections
12	Discussion: Language focus: Academic vocabulary on evaluation	Discussion draft 1
13	Conclusion: Rhetorical structure	Analyzing articles' sections
14	Conclusion: Language focus: Academic vocabulary	Conclusion draft
15	Revising manuscript	The final draft

6.11 Suggestion of a session content

In our attempt to design this course, we consulted and reviewed textbooks (Swales and Feak, 2004; Weissberg & Buker, 1990; McCarthy& O'Dell, 2008; Wallwork, 2011) in addition to our academic knowledge that pertains to publishing. The course is fifteen (15) weeks sessions that aim at familiarizing the research writers, primarily PhD students, with the rhetorical structure of the RA different sections along with the academic vocabulary convenient to each

communicative purpose. Meanwhile, through the practice it provides and the assignments, the course encourages the participants to engage in the publication experience by writing a RA draft. In the following, we tried to present the content of week two (02) and week three in order to inspire instructors about the procedure of teaching this genre.

Week2: Abstract

Rhetorical Structure

Objectives:

- To raise students' genre awareness of the research articles in their discipline.
- To familiarize students with the moves and steps of RA' s sections as well as the arrangement of information within each move.
- To develop students' abilities to analyze and write an abstract that conforms to the convention of their disciplines.

The content:

We first start by introducing the different sections of a RA. The student should know that the abstract is the first part of the RA, but it is the last section to be written as it summarises the content of all the RA sections.

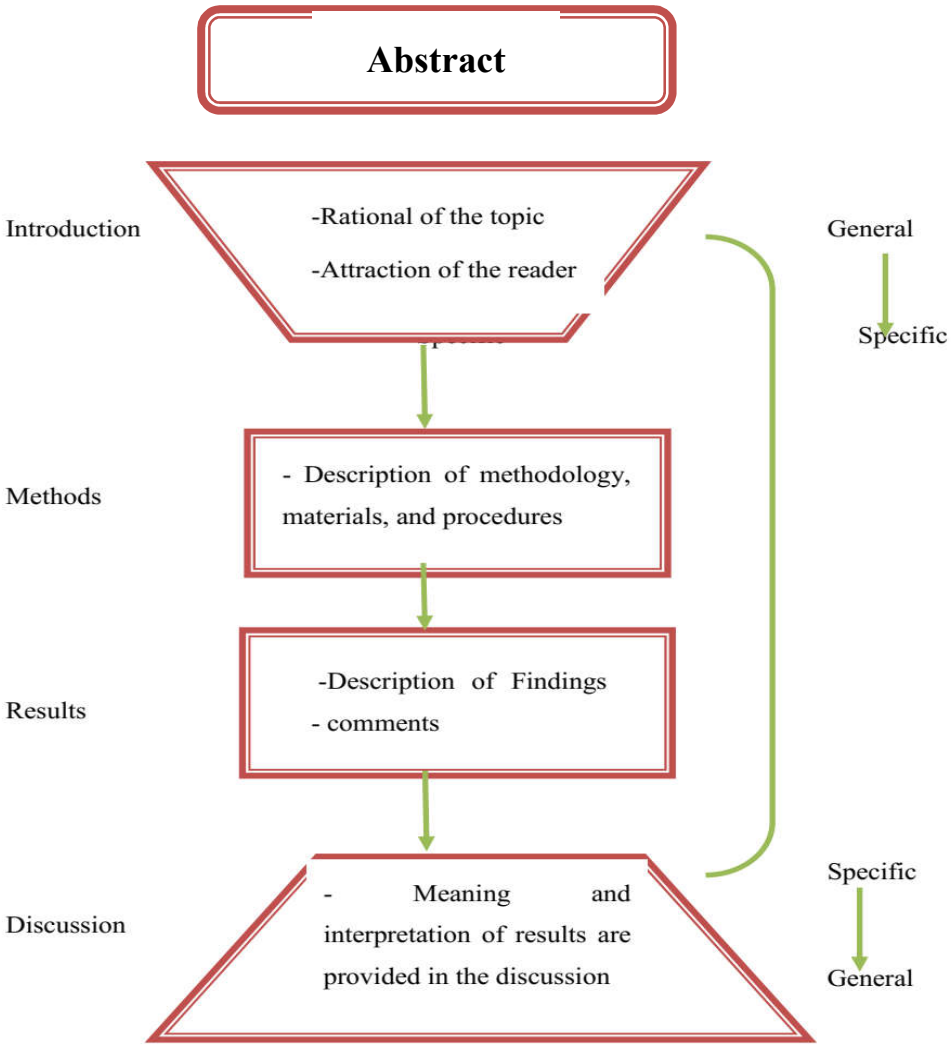

Figure6.1 The RA Structure (adapted from Swales &Feak,1994)

When teaching the abstract rhetorical structure, we start by explicitly explaining the general framework of writing this section. For the abstract case, we present Hylands' model (2002).

Abstract • **Move1: Introduction**: statement of the topic or establishing the topic of research without referring to previous literature.
• **Move 2: Purpose:** the aim of the study should be explicitly stated
• **Move 3:Methods:** describing design, procedure, analysis
• **Move 4: Results:** announcing major findings
• **Move 5**:**Conclusion**: application, implications, recommendations

Then the framework is demonstrated through presenting examples or extracts from published articles in the students' field of study with identifying the moves.

Example :

- **Listening is an essential skill for English as a Foreign Language learners (Move1) studying in English-speaking universities to succeed in various fields of study. To comprehend subject material and improve listening effectiveness, learners are generally advised to develop strategies which help them process the target language in specific contexts. Therefore, the aim of this study was to investigate what strategies were adopted to listen to general and subject-specific English material.(Move2) Furthermore, the study examined the process of listening comprehension in relation to the effectiveness of strategy use. The study was carried out with 92 Taiwanese final-year university students taking EAP courses.(Move3) Questionnaires, listening comprehension questions, and retrospective interviews were used. The results showed that strategy use varied markedly between the two types of listening materials.(Move4) The effectiveness of certain strategy adoption was influenced by topical familiarity and personal experience.(Move 5)** • *English Language Teaching; Vol. 8, No. 2; 2015*

Figure6.2 An Extract of An Abstract

- **Practice:**

The objective:

The practice aims mainly at familiarizing the students with the abstract writing model. At first, students are asked to analyze the framework in a sample section. Then, students are provided with an abstract in which sentences are not presented in their original order. Therefore,

they are expected to reorganize them following the template with identifying the communicative purpose of each sentence.

Exercise: (Adapted from Weissberg & Buker, 1990).

The following is a research article abstract in which sentences are not in their original order. Do the following:

1. Number the sentences in the order you believe they appeared in the original abstract
2. Indicate the communicative purpose of each sentence in the abstract.

> .....In this study, we analyze the position of 467 connectors found in a sample of 12 research papers. Seventy-five percent of the connectors occurred at the beginning of sentences.
> ..... Although sentence connectors are well-recognized feature of academic writing, little research has been undertaken on their positioning.
> ..... These preliminary findings suggest that general rules for connector position will prove elusive.
> .....However, individual connectors varied greatly in positional preference. Some, such as *in addition,* only occurred initially; others, such as *therefore,* occurred initially in only 40% of the cases. **(Swales & Feak, 2004.p212)**

Finally, as an assignment, students are supposed to analyze the abstract of a research article of their choice against the framework to identify the similarities and differences in the rhetorical structures. The aim behind this last practice is to raise their awareness of the generic conventions and highlight them in addition to internalize the moves by students. Actually, the abstracts students choose to analyze are considered as writing examples and present a part of the course content.

Week Three: Abstract

Language focus: Linguistic Features and Academic Vocabulary

The Objective:

- To familiarize students with the main linguistic features of the abstract
- To introduce students with collocations used in abstract writing

Content: Linguistic Features of Abstracts

In this part, we present the abstract different linguistic features with illustrations of each feature:

"1. Abstracts are supposed to be written in full sentences

2. Tenses vary depending on the part presented (different communicative purposes)

3. The use of impersonal passive.

4. The absence of negatives.

5. The avoidance of "abbreviation, jargon, symbols and other language shortcuts that might lead to confusion" (Swales & Feak, 2004)

Practice

Students are requested to analyze the previous features in the following seven sentences abstract to recognize the linguistic features of this genre (Weissberg & Buker, 1990, p. 185).

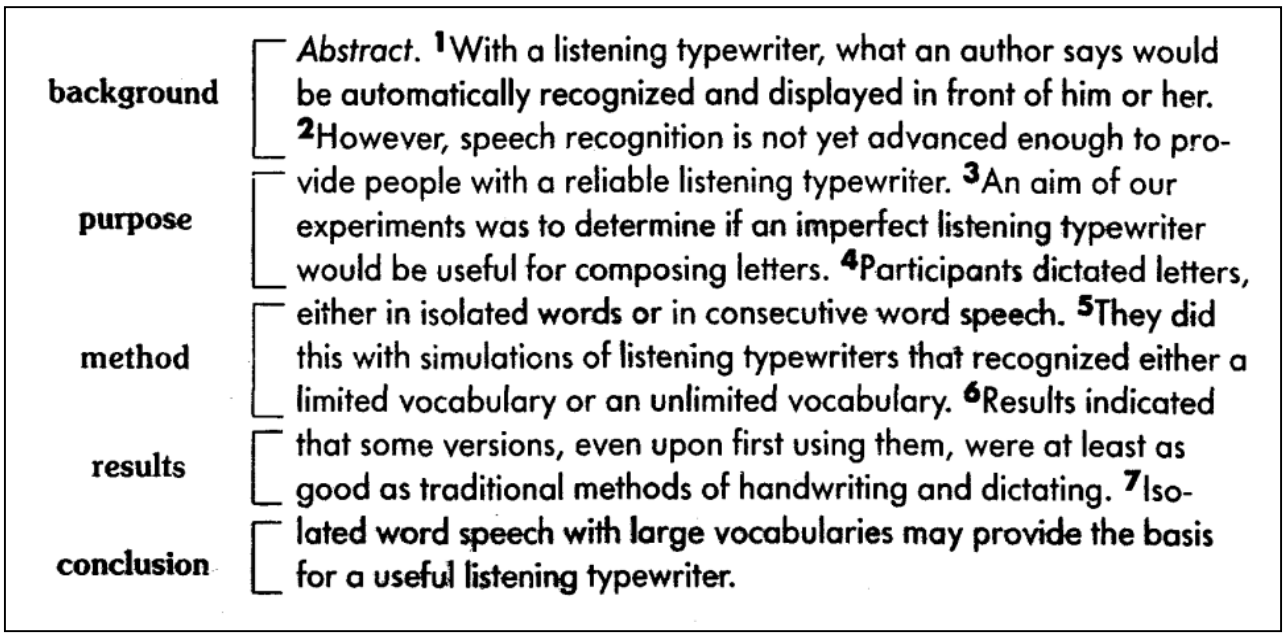

Figure6.3 An Example of An Abstract for Practice

Collocations used in abstract writing

In this part, the teachers can present the students with expressions or phrases they can use in order to realize the different communicative purposes like stating the aim of the research paper:

> ***The aim of our*** **work / research / study / analysis** ***was to*** **further / extend / widen / broaden** ***current***
> ***In this*** **report / paper / review / study** ***we*** **…**
> ***This paper*** **outlines / proposes / describes / presents** ***a new approach to*** **…**
> ***This paper*** **examines / seeks to address / focuses on / discusses / investigates** ***how to solve*** **…**
> ***This paper is*** **an overview of / a review of / a report on / a preliminary attempt to …**
> ***The present paper aims to*** **validate / call into question**
>
> ***X is*** **presented / described / analyzed / computed / investigated / examined / introduced / discussed** ***inorder to*** **…**
> ***Our knowledge of X is largely based on very limited data. The aim of the research was*** **thus /therefore / consequently** ***to*……
> ***The aim of this study is*** **to study / evaluate / validate / determine / examine / analyze / calculate /estimate / formulate …**
> ***This paper*** **calls into question / takes a new look at / re-examines / revisits / sheds new light on** …(Wallwork, 2011)

Assignment

Week two and week three sessions' fruit is writing the first draft of an abstract. Meanwhile, the instructor provides feedback about the abstracts structure and language.

6.12 Conclusion

The main goal of this section was suggesting some solutions for policy makers, institutions, course designers, researchers, and reviewers that may help in achieving the goal of successful publication in international indexed journals. The recommendations were principally emphasizing providing funding and encouragement for research writers. Moreover, institutions are expected to organize workshops about academic writing and establishing centers that provide guidance for novice scholars. Course designers carry the heaviest burden as they are supposed to carry needs analysis that provides a clear picture about the situation, design courses about writing research in sciences, and referring to templates existing in literature to support their courses. Furthermore, Instructors are supposed to share course designers the burden as they are presented with a tentative syllabus of a course that can be presented in 15 weeks. The course focuses on the structural and linguistic aspects of research writing and prepares novice sciences' researchers to produce their first manuscripts. Additionally, disciplinary collaborations are supported among language experts and scientists. Finally, the section ends with suggesting further research about the area to inspire other research projects.

General Conclusion

In seeking membership in academia, sciences' teachers at the University of Sétif1 write research articles in English to be published in international indexed journals, but they struggle with rhetorical organization obstacles during writing for scholarly publication. Thereupon, the present study is an attempt to investigate the rhetorical difficulties sciences teachers at the Faculty of Sciences in the University of Sétif1 face and the strategies that mainly adopted in trying to surpass those difficulties. The dissertation is made up of six (06) integrated chapters.

The first two (02) chapters were theoretical in nature. The former focused on the role of English as an international language of research writing and the effects of its dominance on non - native speakers researchers taking Algeria as an example. The chapter then provided a detailed image about the publication procedure in Algeria using the higher education ministry platform, and the criteria used to acknowledge academic journals for graduation and academic promotion purposes in the Algerian context. In the same vein, writing for research publication purposes was defined; discoursal challenges encountered when writing for publication in English namely language problems, structure of research articles, and problems of style are explained. Finally, the chapter ended with a description of strategies applied by non-native speakers of English in writing their research articles, and a description of the editorial and the publication procedures.

The second chapter presented the different textual approaches to discourse analysis namely: genre analysis, rhetorical move analysis, corpus analysis, and multimodal analysis. The approaches view discourse from different perspectives starting from linguistic and structural angles and moving to social and contextual ones. However, they have the same objective of providing researchers with the necessary linguistic and structural characteristics of discourse. The second part of the chapter was designed to give both analytical and critical vision of the varied sections in the research article with emphasizing the different models developed by

researchers reflecting the rhetorical structure of each section under the scope of rhetorical move analysis approach. As a matter of fact, the second chapter highly contributed in conducting the study practical side. In other words, presenting the different models about research articles sections facilitated the operation of models selection and provided a solid background for the choices.

Then, the third chapter explained the process to determine the structural difficulties and strategies. Actually, a triangulation of data sources was realised between manuscripts' moves analysis, reviewers' reports thematic analysis, teachers' questionnaires and interviews analysis. The study is exploratory in nature starting with a preliminary phase in which twenty (20) questionnaires were delivered to teachers from the Departments of Biology, Agricultural Sciences, and Earth Sciences to evaluate their awareness about the different moves and steps in a research article. Meanwhile, the data obtained served the researcher in selecting the six (06) participants of the interview to investigate the strategies used in overcoming the difficulties. The second phase of the research was based on documents analysis. Moves analysis was applied on fifteen (15) research articles in their original and final versions adopting reliable models from literature in attempt to identify the rhetorical deficiencies in the different sections of the articles. Moreover, the analysis of the reviewers' reports aimed at confirming or on the contrary rejecting the findings of the articles moves analysis.

In the fourth and the fifth chapters, the results obtained from the research tools were used to answer the three (03) research questions. The first one was about diagnosing the rhetorical difficulties the teachers of the different departments suffer from. By comparing the data obtained from the different tools mainly the articles analysis and the reviewers' reports analysis, it was revealed that the participants of the study were struggling with realizing the different obligatory moves and steps in many sections of their articles. Introductions, discussions, and methodology sections were the weak points that received the largest share of the reviewers' comments. In the introduction, for instance, move two of indicating a gap or raising a question was absent in half of the corpus. Though the second move is considered a vital move as it builds the relation between the first and the last ones, the research articles' writers were unable to view the link between the two moves by justifying the necessity of conducting the research.

For the methodology section, the articles analysis indicated the presence of the necessary moves, but the reviewers claimed the absence of necessary details. In fact, the writers missed to detail each procedure they conducted in carrying their studies. Equally, in the discussion section, move one (01) was absent in article one (1), two (2), ten (10), eleven (11), twelve (12), thirteen (13), fifteen (15). Move three (03) and four (04) were absent in all the sections except the one in article eleven (11). Apparently, the writers were unable to support their findings with necessary justifications and interpretations. They were almost satisfied with stating findings like in the results section.

In analyzing the remarks of the reviewers, the prevailing problem was the missing details about the background of the studies in the introduction, the experimental procedures in the methodology section, and interpretation of data referring to previous studies, evaluation of data in the discussion section. The articles writers seemed to have a problem with choosing the suitable references needed to backup their discussion of results and provide solid background of their current research. When presenting their most significant results of research, they were unable to justify their methodological choices or compare and argue their results. Lack of critical skills was the dominating problem in their writings.

Additionally, the data obtained proved a contradiction between what the researchers' theoretically know about the rhetorical structure of a research article and what they actually produce. The analysis of the questionnaire results showed a high level of awareness about the different moves and steps to be considered and realised during writing. Practically speaking, going through the respondents answers demonstrated how aware they were about including the divergent details to strengthen the different sections of their articles, yet when we analyzed the submitted manuscripts, vital moves were not found in the different sections; discussions were poor and based on reporting findings with bare reference to previous literature for the purpose of comparison. The reviewers' reports stressed the scant details about the methodological procedure. The comparison with the models showed a real gap between what should be written in the manuscripts and what actually those teachers write.

The second research question was answered through the interview; the teachers declared that they mainly seek help from their colleagues in writing research. Peer mentorship seemed to be the dominating strategy among sciences teachers at the University of Sétif1. Supervisors and

reviewers have also a significant role in providing guidance to those teachers. Moreover, modeling published texts is also an effective strategy for some of them, while others refer to writing in their mother tongue or language of instruction to translate their final product to English and seek editing from language specialists.

Finally, the last point that was approached during this work was identifying the principal focus of the reviewers in evaluating the submitted manuscripts. The aim behind analyzing the reports is trying to investigate the rhetorical deficiencies the writers of the articles have, and confirm the results obtained from moves analysis of the articles. Supporting the data obtained from the interviews and the articles' analysis, the reports revealed that the main problem with sciences teachers was the scant details about major procedures in the research studies like experimental procedures, statistical procedures and findings reports which represented the absence of vital moves in the articles sections. The reports highlighted serious problems in terms of the critical skills the teachers had as they seemed to be unable to write comprehensible discussions of their research or justify their choices.

In addition, the study sought to confirm the three (03) hypotheses leading the entire work.

1. In addition to scientific values, awareness and application of research articles' generic conventions are indispensable in the writing for publication process.

2. Adopting strategies during the process of writing may alleviate the challenges novice researchers may face when seeking membership in the academic community

3. Following research writing international conventions may reduce reviewers' remarks about research articles.

For the first hypothesis, the reviewers' reports, the articles' analysis and the questionnaire indicated how awareness of the research articles' textual organisation and application of those regulations may help in writing successful research articles with less time and efforts by avoiding extensive revisions of reviewers. Missing to realise important moves in the manuscripts sections mainly the discussion, methodology, and results sections may result in poorly written research articles that may receive successive revisions or rejection from editors and reviewers.

For the second hypothesis, the interviewees explained that their research papers especially the first one were realised due to adopting some strategies. Firstly, they sought help from different members of the discourse community like their supervisors, colleagues, language specialists, or softwares. Secondly, they might adopt another strategy that proved effectiveness in writing research articles which is modelling published texts. They followed the structure of published research articles sections. Thirdly, they exhibited their third strategy that can be realised through referring to translation from their mother tongue to English. Those strategies along with using technical language in some sections like results facilitate the mission of research writing mainly for novice non- native speakers researchers.

For the third hypothesis, analysing the reviewers' reports' content revealed that a high percentage of the comments turns around requests for adding missing information in the research articles sections. On the other hand, models in literature were about the moves that should be realised in each research article section. Accordingly, following those models would have saved researchers' time and effort in carrying the different revisions requested by reviewers. Similarly, reviewers will focus on the scientific value of the research paper rather than its structure and language which in turn increases the researcher chances in publishing in prestigious journals.

The study at the end in chapter six (06) suggests a plethora of implications for the different stakeholders in the research writing and dissemination process. The recommendations for policy makers, institutions, course designers, researchers, and reviewers principally emphasized providing funding, academic guidance, professional support, and financial encouragement for research writers to help in achieving the goal of successful publication in international indexed journals.

For credibility or validity of data in qualitative research, we referred to the harmony between research processes, tools of research, and data (Leung, 2015). It is about the appropriateness of research tools to the realization of the intended objective of the study. Furthermore, validity of data is explained through arguments. In the present study, the question: "what are the rhetorical difficulties that Sétif University sciences teachers face when writing research for publication?" was answered from different perspectives including the researcher, the text, and the reviewer. All those members of the discourse community contributed in building a clear vision bout the problem. For the appropriateness of the research methods, we believe that

the interviews were the best choice for answering the question: “What strategies do Sétif University sciences’ teachers use when writing for scholarly publication?” as the process took place in the natural setting of research writing with members of the discourse community. The participants reported on their real experiences with research writing, the difficulties they encountered, and the strategies they implied to overcome the obstacles. Meanwhile, interviewing was effective because it allowed us to discover other aspects of research writing that are part of their experiences like non-discoursal strategies. On the other hand, questioning was used to collect data about the participants that were then selected for interviews and also to back up document analysis in answering the question: what are the rhetorical difficulties the Sétif University sciences teachers face when writing research for publication? Both of the questionnaire and document analysis were used to answer the question; the questionnaire was used with convenient sampling to investigate the conceptual awareness of the researchers about the structure of their articles and document analysis was carried to check the validity of their answers in concrete sample of their articles.

Finally, the growing interest in writing for scholarly publication highlights the significance of this domain and requires further in-depth research about other disciplines mainly Social and Human Sciences regarding strategies that may help researchers and doctoral students in scholarly publication in surpassing the difficulties and the discursive interactions with reviewers and editors. Similarly, the analysis of the needs of those research writers and the effective practices to satisfy those is of a paramount importance. There is an urgent call to identify the needs of scholars in those fields as publishing in international indexed journals seem to be a dream for them.

The second area that needs to be investigated is writing for scholarly publication pedagogy. Further understanding of pedagogical practices and strategies that help in integrating doctoral students and research writers in academia is highly stressed. Along the same line, research about the most effective policies in teaching and learning writing for scholarly publication should take place to apply the results in the Academic context.

The third research area to be approached is carrying an experimental research design in which different sections of research articles are presented using models from literature aiming at raising the researchers’’ awareness of the research articles rhetorical structure and familiarizing

them with the writing skills in their discipline. Sciences teachers can be asked to analyze the moves of already published articles and write their own articles as assignments. The study can answer the following research Questions:

1. What is the effect of raising Sétif Sciences teachers' awareness of research articles writing international conventions on the improvement of their writing style?
2. Does teaching Sétif Sciences teachers the different moves and steps in the research articles' sections reduce reviewers' negative comments?
3. Does adopting modeling published texts strategy minimize Sciences teachers' problems in rhetorically organizing research articles?

And can test the following hypotheses:

1. If Sétif Sciences teachers' awareness of international conventions of research articles writing is raised; they will have less difficulties in writing their graduation and promotion articles.
2. If we teach Sétif Sciences teachers the different moves and steps in the research articles' sections, they will receive less or no negative comments about their articles structure from reviewers.
3 .If Sétif Sciences teachers adopt modeling published texts strategy in writing their research articles, they will have no problems in rhetorically organizing their research articles

The study can start with a pre test followed by designing courses and presenting materials based on the models in literature. Then a post test and texts analysis will confirm or reject the hypotheses. Meanwhile, the study can focus on the whole article or just the sections that generally receive more comments from reviewers namely the discussion and introduction sections.

In the same vein, longitudinal research is also desired to track the procedure of awareness- raising through teaching doctoral students the concept of moves and steps in research articles. The study can provide a picture of how those students can cope with the challenges and succeed in writing their research articles.

Following the same procedure, the present study can be replicated on other academic genres like book reviews, conference presentations and dissertations. Researchers in different disciplines participate in conferences all over the world; therefore, they are obliged to write and present their works in English. Investigating their rhetorical and linguistic challenges is an important area to be explored. Similarly, non discoursal challengers are worth investigation. Actually, Apart from language proficiency, non native researchers struggle from other factors that hinder their participation in academia like financial, political, or historical factors.

On the cognitive level, research writers follow procedures and use different strategies to achieve their goal. Think aloud procedure or diaries writing are techniques that can be adopted in exploring the researchers' awareness of the rhetorical conventions in writing research articles. A comprehensive description of the procedure would help in identify the area of weakness kind of remedy those researchers need to be successful members of their discourse community.

As far as differences between researchers with English as a second language and others with English as a foreign language are concerned, a comparative study can be conducted with the aim of exploring the differences in the rhetorical difficulties and strategies adopted among those researchers since the status of the language in their countries is not the same. This is an overall set of suggestions that might lead to the scholastic writing improvement for Sciences teachers and students within the Algerian university.

References

References

Adel, S. M., & Moghadam, R. G. (2015). A comparison of moves in conclusion sections of research articles in psychology persian literature and applied linguistics. *Teaching English Language* , 9(2), 167-191.

Adnan, Z. (2009). Some potential problems for research articles written by indonesian academics when submitted to international english language journals. *The Asian EFLJournal Quarterly* , 11(109), 107-125.

Alam, M. (2015). How to review a manuscript. *Dermatologic Surgery* , 41(8),883-888.

Ammon, U. (2006). Language planning for international scientific communication: an overview of questions and potential solutions. current issues in language planning. *Current Issues in Language Planning 7 (1)* , 1-30.

Amnuai, W; Wannaruk, A

Amnuai, W. & Wannaruk, A. (2011). A move- based analysis of the conclusion sections of research articles published in international and Thai journ. *The Southeast Asian Journal of English language studies* , 19(2), 53-63.

Anthony, L. (1999). Writing research article introductions in software engineering: How accurate is a standard model? *IEEE Transactions on Professional Communication* , 42(1), 38-46.

Aslam, I., & Mehmood, A. (2014). Genre analysis of conclusion sections of pakistani research articles in natural and social sciences. *Journal of Natural Sciences Research* , 4(22),106-112.

Association, A. P. (20101). *Publication manuel of american psychological association.* Washington DC: British Library Cataloguing-in-Publication Data.

Bakhtin, M. M. (1981). *The dialogic imagination: four essays.* USA: University of Texas Press.

Bakhtin, M. (1986). *Speech genres and other late essays.* USA: University of Texas Press.

Bavdekar, S. B., & Save, S. (2015). Choosing the right journal for a scientifc paper. *Journal of The Association of Physicians of India* , 63,56-59.

Bazerman, C. (1983). Scientific writing as a social act:a review of thee literature of the sociologuy of science. In P.Anderson, J. Brockman, & C.Miller(Eds), *New Essays in technical writing and* communication(pp. 156-184). Farmingdale, New York: Baywood.

Behnam, B. (2014). A Genre analysis of english and iranian research articles abstracts in applied linguistics and mathematics. *International Journal of Applied Linguistics & English Literature* , 35 (5), 172- 179.

Belcher, D. (2006). English for specific purposes : Teaching to perceived and imagined futures in worlds of work study, and everyday life . *TESOL Quarterly* , 40 , 133 – 56.

Bhatia, V. K. (1994). *Analyzing genre: Language use in professional setting.* London: Longman.

Bhatia, V. K. (2008). Towards a critical genre analysis . In V. Bhatia, J.Flowerdew, & R. Jones, *Advances in discourse studies* (pp. 166 – 77). London: Routledge.

Bornmann, L., Weymuth, C., & Daniel, H.-D. (2009). A content analysis of referees' comments:how do comments on manuscripts rejected by a high-impact journal and later published in either a low or high-impact journal differ? *Scientometrics* , 83,493–506.

Bowen,G.(2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal,* 9(2),27-40

Braxely, k. (2005). Mastering academic English: International graduate students' use of dialogue and speech genres to meet the writing demands of graduate school. In J. K. Hall, G. Vitanova, & L. Marchenkova(Eds), *Dialogue with Bakhtin on second and foreign language learning: New perspectives* (pp. 11-32). NewJersey: Lawrence Erlbaum Associates.

Breeze, R. (2014). Multimodal analysis of controversy in the media. In G. Thompson, & L. Alba-Juez, *Evaluation in context* (pp. 304-319). USA: John Benjamins Publishing Company.

Buckingham, L. (2008). Development of English Academic writing competence by turkish scholars. *International Journal of Doctoral Studies* , 3,1-18.

Bunton, D. (2005). The structure of PhD conclusion chapters. *English for Academic Purposes* , 4, 207–224.

Burrough-Boenisch, J. (2003). Shapers of published NNS research articles. *Journal of Second Language Writing* , 12, 223-243.

Coxhead, A. (2000). A new academic word list. *TESOL Quarterly* , 34(2),213–38.

Creswell, J. W. (2007). *Qualitative inquiry & research design: Choosing among five approaches.* Thousand Oaks, CA: Sage Publications.

CreswelL, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches.* Thousand Oaks, California: Sage Publication.

Creswell, J. W. (2011). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. (4th Ed.). New York: Pearson.

Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches.* Thousndas Oak, California: SAGE Publications.

Darabad, l. M. (2016). Move analysis of research article abstracts: A cross-disciplinary study. *International Journal of Linguistics* , 8(2), 125-140.

Davis,Y.(2013). The development of source use by international postgraduate students. J*ournal of English for Academic Purposes,* 12(2),125–135

Day, R. A. (1998). *How to write and publish a scientific paper.* Arizona: Oryx Press.

Deal, H. (2009). *Science research writing for non-native speakers of English.* London: Imperial College.

Dornyei, Z. (2007). *Research methods in applied linguistics.* New York: Oxford University Press.

Dornyei,Z. (2010). *Questionnaires in second language research: Construction, administration, and processing.* New York: Routledge.

Dos Santos, M. B. (1996). The textual organization of research paper abstracts in applied linguistics. *Text - Interdisciplinary Journal for the Study of Discourse* , 16(4), 481-500.

Dudley-Evans, T. (1994). Genre analysis: an approach to text analysis for ESP. In M. Coulthard, *advances in written text analysi* (pp. 219–228). London: Routledge.

Duszak, A., & Lwkowicz, J. (2008). Publishing academic texts in English: A polish perspective. *Journal of english for Academic Purposes* , 7(2),108-120.

Ebrahim, N. A., Gholizadeh, H., & Lugmayr, A. (2017). Maximized research impact: An effective strategies for increasing citations. In A. Lugmayr, & D. Vogel(Eds), *managing and leading creative universities - foundations of successful science management: A hands-on guide for (future) academics* (pp. 29-51). Tampere,Finland: International Ambient Media Association (iAMEA).

Elhamza, M. (2018). منصة الدوريات العلمية الجزائرية وسيلة للنفاذ المفتوح وآلية حقيقة للقضاء على البيروقراطيةوالمحسوبية العلمية أم مجرد أوهام وموضة تكنولوجية!

؟(The Algerian Scientific Journal Platform (ASJP): is it amean of an open access and a real tool to eradicatebureauc. *journl of scocial and human sciences* , 16,26-44.

Flowerdew, J. (1999). Problems in writing for scholarly publication in English: The case of Hong Kong. *Journal of second language writing* , 8, 243-264.

Flowerdew, J. (2000). Discourse community, legitimate peripheral participation, and the nonnative-english-speaking scholar. *Tesol Quarterly* , 34(1), 127-150.

Flowerdew, J. (2001). Attitudes of journal editors to nonnative speaker contributions. *TesoL Quarterly* , 35, 121-150.

Flowerdew, J.,& Dudley-Evans, T. (2002). Genre analysis of editorial letters to international journal contributors. *Appled Linguistics* , 23(4), 463-489.

Flowedew, J., & Li, Y. (2007). Language re-use among chinese apprentice scientists writing for publication. *Applied Linguistics* , 28(3), 440–465.

Flowerdew, J. (2008). Scholarly writers who use English as an Additional Language:What can Goffman's ''Stigma'' tell us? *Journal of English for Academic Purposes* , (7),77-86.

Flowerdew, J. (2013). English for research publication purposes.,In B. Paltridge, & S. Starfield(Eds), *The handbook of english for specific purpose* (p. 301). UK: John Wiley & Sons, Inc.

Gosden, H. (2001). "Thank you for your critical comments and helpful suggestions": compliance and conflict in authors' replies to referees' comments in peer reviews of scientific research papers. *Ibérica* , 3, 3-17.

Gosden, H. (1992). Research writing and NNSs: From the editors. *journal of Second language Writing* , 1(2), 123-139.

Gosden, H. (1995). Success in research article writing and revision:A social-constructionist perspective. *English for Specific Purposes* , 14(1), 37-57.

Gosden, H. (2013). Verbal reports of Japanese novices' research writing. *Journal of Second Language Writing* , 5(2), 109-128.

Habibie, P. (2015). *An Investigation into Writing for Scholarly Publication by Novice Scholars: Practices of Canadian Anglophone*(Doctoral dissertation, The University of Western Ontario). Retrieved from https://ir.lib.uwo.ca/cgi/viewcontent.cgi?article=4863&context=etd

Halloran, K. L., Tan, S., & Marissa, K.L. (2015). Multimodal analysis for critical thinking. *Learning Media and Technology* , 42(2),1-24.

Hames, I. (2007). *Peer Review and manuscript management in scientific journals guidelines for good practice.* USA: Blackwell Publishing.

Hanauer, D. I., & Englander, K. (2011). Quantifying the burden of writing research articles in a second language: Data from Mexican scientists. *Written communication* , 28(4), 403-416.

Hasrati, M. (2005). Legitimate peripheral participation and supervising Ph.D. students. *Studies in Higher Education* , 30(5), 557–570.

Hein, G. (2007). *Constructivist learning theory.* Anachusetts: Lesley College Press.

Hill, J. A. (2016). How to review a manuscript. *Journal of Electrocardiology* , 49(2), 109-258.

Holmes, R. (1997). Genrs anlysis and the social sciences:An investigation of the Structure of research article discussion sections in three desciplines. *English for Specific Purposes* , 16(4),321-337.

Hyland, K. (2000). *Disciplinary discourses: Social interactions in academic writing.* London, UK: Longman.

Hyland, K. (2004a). *Disciplinary discourses:Social interactions in academic writing.* Ann Arbor, M: The University f Michigan Press .

Hyland, K. (2004b). *Genre and second language writing.* Ann Arbor,M: The University of Michigan Press.

Hyland, K. (2006). *English for academic purposes: An advanced resource book.* London & USA: Routledge.

Hyland, K. (2008). Genre and academic writing in the disciplines. *Language Teaching* , 41 ,543 – 62.

Hyland, k. (2009). *Academic discourse. English in a global context.* London: Continuum.

Hyland, K. (2011). Academic discourse. In K. Hyland, & B. Paltridge(Eds), *Continuum Companion to Discourse analysis* (pp. 171 – 84). London: Continuum.

Hyland, K. (2013). ESP and writing. In B. Paltridge, & S. Starfield(Eds), *The handbook of english for specific purposes* (pp. 95-113). UK: Wiley-Blackwell.

Jackson, V. (2006). *Basic assumptions of social constructivism in international relations.* Thousand Oaks CA: Sage Publications.

Kanamarub,M., Kanamaru,T., & Tajino, A. (2015). Move analysis of research articles across five engineering fields:What they share and what they do not. *Ampersand* , 2,1-11.

Kanoksilapatham, B. (2005). Rhetorical structure of biochemistry research articles. *English for Specific Purposes* , 24 (3), 269-292.

.

Kanoksilapatham, B. (2007a). Introduction to move analysis. In D. Biber, U. Connor, & T. A. Upton(Eds), *Discourse on the move: Using corpus analysis to describe discourse structure* (pp. 23-42). The Netherlands. USA: John Benjamins Publishing Company.

Kanoksilapatham, B. (2007b). Rhetorical moves in biochemistry research articles. In D. Biber, U. Connor, & T. A. Upton(Eds), *Discourse on the move: Using corpus analysis to describe discourse structure* (pp. 73-81). The Netherlands. USA: John Benjamins Publishing Company.

Kanoksilapatham, B. (2009). Generic structure of research article abstracts in sciences. *Journal of Studies in the English Language,4.*

Kaplan, R. B. (1997). *Language planning for practice to theory.Clevedon: Multilingual Matters.* London: Imperial College Press.

Kaplan, R. B., Jr, & Baldauf, R. B. (2005). Editing contributed scholarly articles from a language management perspective. *Journal of Second language Writing* , 14(3):47-62.

Kay L. O, H., Tan, S., & E, a. M. (2017). Multimodal analysis for critical thinking. *Learning Media and Technology* , 42, (2), 147-170.

Kim, B. (2006). *Social constructivism.* New York: Routledge.

Kwan, B. (2006). The schematic structure of literature reviews in doctoral theses of applied linguistics. *English for Specifc Purposes* , 25(1), 30–55.

Lave, J., & Wenger, E. (1991). *Situated learning: legitimate peripheral participation.* Cambridge, UK: Cambridge University Press.

Lee, C. D. (2004). Double voiced discourse: African american vernacular english as resource in cultural modeling classrooms. In A. F. Ball(Eds), *Bakhtinian perspectives on language,literacy, and learning* (pp. 129-147). Cambridge : Cambridge University Press.

Lei, S. A., & Chuang, N. (2009). Research collaboration and publication during graduate studies: Evaluating benefits and costs from students' perspectives. *College Student journal* , 43(4), 1163-1168.

Li, Y. (2002). Writing for international publication :The perception of Chinese doctoral researchers. *Asian journal of English Language Teaching* , 12,179-193.

Li, Y. (2005). Multidimensional enculturation: The case of an EFL Chinese doctoral student. *Journal of Asian Pacific Communication* , 15(1 ,)53–70.

Li, Y. (2006a). Negotiating knowledge contribution to multiple discourse communities: A doctoral student of computer science writing for publication. *Journal of Second Language Writing* , 15,159–178.

Li, Y. (2006b). A doctoral student of physics writing for publication: A sociopolitically-oriented case study. *English for Specific Purposes* , 25, 456–478.

Li, Y., & Flowerdew, J. (2007). chaping chinese novice scientists' manuscripts for publication. *Journal of Second Language Writing* , 16,100-117.

Lillis, T., & Curry, M. J. (2006). Professional academic writing by multilingual scholars: Interactions with literacy brokers in the production of English-medium tetxs. *Written Communication* , 23, 3-35.

Lillis, T., & Curry, M. J. (2010). *Academic writing in a global context: the politics and practices of publishing in english.* london: Routledge .

Lim, J. M. (2006). Method sections of management research articles: A pedagogically motivated qualitative study. *English for specific Purposes* , 25, 282-309.

Lin, L., & Evans, S. (2012). Structural patterns in empirical research articles: A cross-disciplinary study. *English for Specific Purposes* , 31,150–160.

Loi, C. K. (2010). Research articles introductions in Chinese and English:a comparative genre-based study. *Journal of English for Academic Purposes* , 9,267-279.

Maswana, S., Kanamaru, T., & Tajino, A. (2015). Move analysis of research articles across five engineering fields: What they share and what they do not. *Ampersand* , 2,1-11.

Mauranen, A., Pérez-Llantada, C., & Swales, J. (2010). Academic Englishes: A standardized Knowledge? In A. Kirkpatrick(Eds), *The routledge handbook of world englishes* (p. 634). London: Routledge.

Melchers, G., & Shaw, P. (2003). *World Englishes: An introduction.* London: Arnold.

Mogashoa, T. (2014). Applicability of constructivist theory in qualitative educational research. *American International Journal of Contemporary Research* , 4(7).

Moreno, A. I., Rocha, J. R., Burgess, S., Lopez-Navarro, I., & Sachdev, I. (2012). Spanish researchers' percieved difficulty writing research articles foe english-medium journals: The impact of proficiency in english versus publication experience. *Ibérica* , 24,157-184.

Mouloudj, K. (2018). معوقات نشرالبحوث التربوية في المجلات العلمية(Difficulties of eduactional research paublication in scientific journals). *International Journal of Educational and Psychological Studies* , 3(3), 668 -687.

Moyetta, D. (2016). The discussion section of english and and Spanish research articles in psychology: a contrastive study.*ESP Today* , 4(1),87-106.

Neuman,W.(2007). *Basics of Social Research: qualitative and Quantitative approaches. Boston: Pearson Education.*

Ngankee,WD., Roachi,VJ.,& Lau,T,K. (1997). How accurate are references in the Australian and New Zealand Journal of Surgery? comment. *Aust NZ J surg* , 67(7), 417-419.

Nwogu, K. N. (1997). the medical research paper: Structure and function. *English for Specific Purposes* , (16), 2, 119-138.

Paltridge, B. (2013). Genre and English for specific purposes. In B. Paltridge, & S. Starfield(Eds), *The handbook of english for specific purposes* (pp. 349-366). UK: Wiley-Blackwell.

Patton, M. Q. (2002). *Qualitative research and evaluation methods*. Thousand Oaks, CA: Sage Publications.

P é rez – Llantada, C., Plo, R., & Ferguson, G. (2011). You don ' t say what you know,only what you can " : The perceptions and practices of senior Spanish academics regarding research dissemination in English. *English for Specific Purposes 30* , 18 – 30.

Pe´ rez-Llantada, C. (2014). *Scientific discourse and the rhetoric of globalization: The impact of culture and language.* London: Bloomsbury.

Peacock, M. (2002). Communicative moves in the discussion section of research articles. *English for Specific Purposes* , 30, 479–497.

Peacock, M. (2011). The structure of methods sections in research articles across. *Asian ESPJournal* , 7, 99-124.

Posteguillo, S. (1999). The schematic structure of computer science research articles. *English for Specific Purposes* , 18(2), 139-160.

Prior, P. (1998). *Writing/Disciplinarity: A sociohistoric account of literate activity in the academy.* Hillsdale, NJ: Lawrence.

Prior, P. (2013). Multimodality and ESP research. In B. Paltridge, & S. Starfield(Eds), *The handnook of english for specificc purposes* (pp. 519-534). USA: Wiley-Blackwell.

Rank, S. J. (n.d.). *SCImago Journal & Country Rank*. Retrieved Decemeber 20th, 2019, from SCImago Journal & Country Rank: www.scimagojr.com

Rank, S. J. (n.d.). *SCImago Journal & Country Rank*. Retrieved Decemeber 20th, 2019, from SCImago Journal & Country Rank: www.scimagojr.com

Roberts, L. W., Coverdale, J., Edenharder, K., & Louie, A. K. (2004). How to review a manuscript: a “down-to-earth” approach. *Academic Psychiatry* , 28(2),81-87.

Ruiying, Y., & Allison, D. (2003). Research articles in applied linguistics: moving from results to conclusions. *E nglish for Specific Purposes* , 22,365–385.

Ruiying, Y., & Allison, D. (2004). Research articles in applied linguistics:structures from a functional perspective. *English for Specific Purposes* , 23 , 264–279.

Salager-Meyer, F. (1990). Discoursal flaws in Medical English abstracts: A genre analysis per research- and text-type. *Text - Interdisciplinary Journal for the Study of Discourse* , 10(4), 365–384.

Sambunjak, D., Huić, M., Hren, D., Katić, M., Marušić, A., & Marušić, M. (2009). National vs. international journals: views of medical professionals in Croatia. *Learned Publishing, 22 (1). pp. 57-70.* , 22(1), 57-70.

Samraj, B. (2002). Introductions in research articles: Variation across disciplines. *English for Specific Purposes* , 21(1), 1-17.

Shehzad, W. (2010). Announcement of principle findings and value addition in Computer Science research paper. *Iberica* , 19(19) ,97-118.

Sibers,R., & Holt, S. (2000). Accuracy of references in five leading medicine journals. *Lancet* , 356(9239), 1445.

Sionis, C. l. (1995). Communication strategies in the writing of scientific research articles by non-native users of English. *English for SpecificPurposes* , 14(2), 99- 113.

Spigt, M., & Arts, I. C. (2010). How to review a manuscript. *Journal of Clinical Epidemiolog* , 6,1385-1390.

Stake, R. E. (2005). Qualitative case studies. In N. K. Denin, & Y. S. Lincoln(Eds), *The sage handboock of qualitative research* (pp. 443-466). Thousend oaks, London: Sage Publication.

Swales, J. M. (1981). *Aspects of article introductions*. Birmingham, UK: Aston University.

Swales, J. M. (1990). *Genre analysis.* UK: cambridge University Press.

Swales, J. M., & Feak, C. B. (1994). *Academic writing for graduate students:essential tasks and skills.* Ann Arbor: The University of Michigan Press.

swales, J. M. (2004). *Research genres.* UK: Cambridge University Press.

Swales, J. M., & Feak, C. B(3rd ed). (2012). *Academic writin for Graduate students.* Michigan:Michigan series in english for Academic and professional purposes.

Talmy, S. (2010). Qualitative interviews in applied linguistics: From research instrument to social practice. *Annual Review of Applied Linguistics* , 30, 128-148.

Tardy, C. (2004). The role of English in scientific communication: ‘‘Lingua franca’’ or ‘‘Tyrannosaurus rex’’? *Journal of English for Academic Purposes* , 3, 247-269.

Taylor, D. M. (2002). The appropriate use of references in a scientific research paper. *Emergency Medicine* , 14.

Tompson, D. (1993). Arguing for experimental facts in science. *Written Communication, 10*(1), 106–128.

Tse, P., & Hyland, K. (2006). ‘“So what is the problem this book addresses?” Interactions in book reviews’. *Text and Talk* , 27, 767–90.

Uzuner, S. (2008). Multilingual scholars' participation in core/global academic communities: A literature review. *Journal of English for Academic Purposes 7(4)* , 250-263.

Vanderstope,S,W., Johnston, D.(2009). *Research mthods for Every Day Life: Blending Qualitative and quantitative approaches.*

Ventola, E., & Mauranen, A. (1996). *Academic writing : Intercultural and textual issues.* Amsterdam: John Benjamins Publishing Company. San Francisco: John Wiley & Sons, Inc

Williams, R. (1999). Results section of medical research articles: An analysis of rhetorical categories for pedagogical purpose. *English for Specifc Purposes, 18*(4), 347–366.

Wincka, J.C,. Fonsecab, J.A,. Azevedob, L.F,. & Wedzicha, J.A. (2011). To publish or perish: How to review a manuscript. *Rev Port Pneumology* , 17(2),96-103.

Wood, a. (2001). International scientific English: The language of research scientists around the world. In J. Flowerdrew, & m. Peacock(Eds), *Research perspectives on english for academic purposes* (p. 71). Uk: Cambridge University Press.

Yakhontova, T. (2002). "Selling" or "telling"? The issue of cultural variation in. In J. Flowerdew(Eds), *Academic discourse* (pp. 216-232). Harlow: Pearson Education.

Yin, R. K. (2009). *Case study research: Design and methods (4th ed.).* Los Angeles, CA: Sage Publications.

Zamani, G., & Ebadi, S. (2016). Move analysis of the conclusion sections of research papers in Persian and english. *Cypriot Journal of Educational Science* , 11(1), 09-20.

Touahir, A., & Bechir, B. c. (2019).

اثرجودة البوابة الجزائرية للدورياتالعلمية على رضا المستخدمين - باستخدام نموذج ديلون وماكلين- دراسة ميدانية لعينة من اعضاء هيئة التحرير للمجلات العلمية صنف"ج" بالجزائر

(The impactof Algerian scientific journals portal quality(ASJP) on users satisfaction By using the Delon and Mclean(D&M)-.A study of sample of the editorial board of reviews classified in "C" category. *Algerian journal of Economic Development* , 6(2),85- 98.

Appendices

Appendix A

Conditions of Graduation

REPUBLIQUE ALGERIENNE DEMOCRATIQUE ET POPULAIRE

Ministère de l'Enseignement Supérieur et de la Recherche Scientifique

Le Ministre

Circulaire n° 03 du 07 JUIL. 2019
fixant les conditions de soutenance d'une thèse de doctorat et ses modalités

La présente circulaire a pour objet de préciser les conditions et les modalités de soutenance d'une thèse de doctorat pour les doctorants inscrits à partir de l'année universitaire 2016-2017. Dans ce cadre, il est à rappeler que la soutenance d'une thèse de doctorat est régis par les dispositions du décret exécutif n°08-265 du 17 Chaâbane 1429 correspondant au 19 août 2008, portant régime des études en vue de l'obtention du diplôme de licence, du diplôme de master et du diplôme de doctorat et de l'arrêté n°547 du 02 juin 2016, fixant les modalités d'organisation de la formation de troisième cycle et les conditions de préparation et de soutenance de la thèse de doctorat.

A. Conditions de recevabilité du dossier de soutenance :

- Un document attestant que le doctorant a obtenu cent quatre-vingt (180) points répartis selon la grille préétablie de soutenabilité fixée par l'arrêté n°547 du 02 juin 2016 ;
- Le rapport, établi par le directeur de thèse, attestant la soutenabilité du travail est comprenant deux documents :
  - Un document attestant que la qualité du travail et les objectifs fixés sont atteints **(Annexe 1)**.
  - Un document attestant que la publication scientifique est en relation directe avec la thématique de la thèse (**Annexe 2**).
- Un document présenté par le doctorant attestant que le candidat est régulièrement inscrit en doctorat **(Annexe 3)** ;
- Un document attestant de l'avis du comité de formation doctorale (CFD).

B. Dossier de soutenance :

- Un exemplaire de la thèse ;
- Le rapport de directeur de thèse attestant la soutenabilité du travail **(Annexe 1 et 2)** ;

- La ou les publications scientifiques ou toutes autres productions scientifiques en relation avec la thèse ;
- Le carnet du doctorant dûment renseigné et visé.

Le dépôt de dossier est assuré par le directeur de thèse au niveau des services chargés de la formation doctorale de l'établissement universitaire d'inscription.

Conformément aux critères fixés par la Commission Scientifique Nationale de Validation des Revues Scientifiques, les conditions de soutenabilité du travail se déclinent comme suit :

- **Concernant les domaines S&T :** Il est exigé une (01) publication dans une revue de catégorie **B** au minimum ;
- **Concernant les domaines SHS :** Il est exigé une (01) publication dans une revue de catégorie **C** au minimum.

Dans ce contexte, Il y a lieu de préciser également ce qui suit :

- Le doctorant doit satisfaire les conditions contenues dans la grille préétablie de soutenabilité fixée par l'arrêté n°547 du 02 juin 2016 **(Annexe 4)** ;
- Le doctorant doit figurer en première position de la liste des auteurs dans la publication, à l'exception des revues des domaines qui adoptent l'ordre alphabétique ;
- La publication peut ne pas porter le nom du directeur de thèse si ce dernier l'autorise par écrit ;
- Dans l'article publié par le doctorant, doivent figurer les intitulés du laboratoire d'affiliation et de l'établissement universitaire d'inscription ;
- Ne sont pas acceptés, les articles publiés dans les revues prédatrices ou chez des éditeurs prédateurs, dont la liste est fixée annuellement par la Commission Scientifique Nationale de Validation des Revues Scientifiques.

C. Acheminement du dossier de soutenance :

- Le dossier doit être déposé, au niveau du service chargé de la formation doctorale de l'établissement universitaire d'inscription ;
- Le CFD propose aux instances scientifiques habilitées un (01) jury conformément aux dispositions de l'arrêté n°547 du 02 juin 2016, sus visé ;
- L'instance scientifique concerné au niveau de la faculté ou de l'institut de l'université ou du centre universitaire ou de l'école fixe la composition du jury et la soumet au chef d'établissement ;
- Le service chargé de la formation doctorale transmet le dossier de soutenance aux membres de jury pour évaluation ;

Appendix B

Classfication of Scientific Journals

الملحق رقم 4

تصنيف المجلات العلمية

الفئة الاستثنائية: المجلات "nature" و "science".

الفئة أ +: المجلات العلمية المدرجة في "Web of science" للناشر THOMSON REUTERS(مع معامل التأثير) والواردة ضمن العشرة بالمائة (10) الأوائل لكل تخصص.

الفئة أ: المجلات العلمية المدرجة في "WEB OF SCIENCE" للناشر REUTERSTHOMSON وتعتبر الفئة أدنى درجة التي تسمح بمقروئية المؤسسات.

بالنسبة لهذه الفئات الثلاث نجدها ضمن قائمةJCR(Journal Citation Report) للناشرREUTERSTHOMSON

الفئة ب: تتضمن هذه الفئة البيانات الانتقائية التالية(القائمة ليست حصرية).

- قائمة ""All databases" للناشر THOMSON REUTERS (medlineinspecbiosis…..).
- قائمة SCOPUS
- حوليات علم الاثار العربية السورية
- قائمة DEGRUGER
- القائمةالمحينةAERES
- القائمة الأوربية المحينةERIH
- قائمة المجلات العلمية الأوسترالياةABDC
- قائمة المجلات العلميةCNRS
- قائمة المجلات العلمية JOURNAL QUALITY LIST
- قائمة المجلات العلميةFINANCIAL TIMES

الفئة جـ: تتضمن المجلات العلمية التي تتوفر على الشروط التالية:

- يجب أن تكون المجلة ضمن قائمة المجلات المقبولة من طرف اللجنة العلمية الوطنية للتأهيل المجلات العلمية والتي تمّ إنشاؤها بالقرار رقم 393 المؤرخة في 17 جوان 2014.
- يجب أن تكون للمجلة أقدمية سنتان (02) وأربع (04) أعداد على الأقل.
- أن تكون المجلة مجانية (لا يشترط على المؤلفين دفع مقابل للنشر).
- يجب أن تكون للمجلة نسخة إلكترونية وأن تكون جميع مقالاتها قابلة للتحميل على حدى والعدد إجمالا،وتتوفر فيها المعايير التالية:
- يجب أن يكون للمجلة رقم إيداع قانونيISSN
- يجب أن تتضمن المجلة الدورية والانتظام في النشر
- ذكر الميادين العلمية التي تناولتها المجلة في صفحات تقديمها.
- يجب أن يكون للمجلة رئيس تحرير وهيئة تحرير دولية.
- يجب ذكر الناشر ومكان النشر في صفحات التقديم
- ذكر أسماء الهيئات المستخدمة لرئيس التحرير وأعضاء هيئة التحرير الدولية في صفحات التقديم.

- ذكر العنوان الفعلي والالكتروني لأمانة المجلة في صفحات التقديم.
- ذكر العنوان الكامل والمختصر والإيداع القانوني ISSN والجزء والعدد وتاريخ الصدور في صفحات التقديم.
- يجب صياغة المنشور بصيغة DOC أوTEXTأو LATEX وتتضمن تعليمات للناشرين.
- ذكر إجراءات طلب للنشر
- وضع فهرس لكل عدد تم نشره ويتضمن عناوين المقالاتوالناشرين والصفحات.
- يتضمن كل مقال في مجلة اسم الهيئة المستخدمة للناشرين، تاريخ الإيداع، تاريخ المراجعة، تاريخ القبول، الملخص والكلمات المفتاحية.
- يتم تقييم كل مقال من طرف مصححين اثنين (2) على الأقل.

تتضمن التعليمات للناشرين ضرورة أن يكون العمل أصلي لم يتم نشره من قبل.

Appendix C: Sciences' Teachers' Questionnaire: Writing for Scholarly Publication by Algerian Researchers

You are kindly requested to answer this questionnaire which is about Writing for Scholarly Publication by Algerian Researchers. The survey is part of a doctoral research work that aims at investigating the challenges and complexities Algerian Researchers face when writing and organizing research Articles. Your help and cooperation would be highly appreciated

*Obligatoire

Section One: General Information

1. **What is your actual role in respect of scientific research? Quel est votre position actuelle dans la recherche scientific?**
   Une seule réponse possible.

   - ◯ doctoral researcher
   - ◯ Research engineer
   - ◯ Research director
   - ◯ Permanent researcher
   - ◯ Professor/ Researcher
   - ◯ Autre : _____

2. **What is your field or research? Quelle est votre spécialité?** *
   Une seule réponse possible.

   - ◯ Biology
   - ◯ Chemistery
   - ◯ Medicine
   - ◯ Physics
   - ◯ Mechanical engineering
   - ◯ Autre : _____

3. **How many years of experience do you have in scientific research? Combien d'années d'experience avez-vous dans la recherche scientifique?** *
   Une seule réponse possible.

   - ◯ 1-5 Years
   - ◯ 6-10 Years
   - ◯ 10 Years and up

Section Two: Research writing and English

4. **Have you published research articles in English in international, indexed, peer-reviewed journals ? Avez -vous déja publié des articles de recherch en anglais dans des revues internationales, indexée avec des comités de lecture?** *
Une seule réponse possible.

- ◯ yes
- ◯ No
- ◯ Autre : _____

5. **Your Research article (s)was published in journals from : Votre article de recherche a-t-il était publié dans une revue:**
Une seule réponse possible.

- ◯ class A+
- ◯ class A
- ◯ class B
- ◯ No publication

6. **Do you find writing research articles in English difficult? Voyez - vous l'écriture des articles de recherche en anglais difficile?** *
Une seule réponse possible.

- ◯ Yes
- ◯ No
- ◯ Do not know

7. **If yes , explain your choice; it is difficult because of: (many choices are possible) Si oui, expliquez votre choix; c'est difficile a cause de: vous pouvez choisir plusieurs options**
Plusieurs réponses possibles.

- ☐ Academic vocabulary
- ☐ Writing grammatically correct sentences
- ☐ Flow of information in paragraphs
- ☐ English way of presenting information
- ☐ Autre : _____

8. **Do you believe that the language mastery is highly important in writing research articles? Pensez- vous que la maitrise de la langue est-elle très importante dans la rédaction des articles scientifiques?** *
Une seule réponse possible.

- ◯ YES
- ◯ No

9. **If yes, explain your choice; it is important because: Si oui, expliquz votre choix, c'est important parce que:(vous pouvez choisir plusieurs options)**
Plusieurs réponses possibles.

- [ ] Journals accept articles with high standards of language
- [ ] The writer gains time to be invested in resarch
- [ ] The writer can present his research in clear original way
- [ ] Autre : _____

10. **8. Do you believe that ideas organization is highly important in writing research articles? Pensez- vous que l'organisation des idées est-elle très importante dans la rédaction des articles scientifiques?**
Une seule réponse possible.

- ◯ Yes
- ◯ No

11. **if yes, Explain your choice; it is important because: Si oui, expliquz votre choix, c'est important parce que: (vous pouvez choisir plusieurs options**
Plusieurs réponses possibles.

- [ ] It helps in presenting ideas and understanding them
- [ ] It helps in the organization of the entire text
- [ ] It is the main interest of editors
- [ ] Autre : _____

12. **What are the main difficulties you find in writing research articles in English? Quelles sont les principales difficultés que vous trouvez dans la rédaction des articles scientifiques en anglais? (vous pouvez choisir plusieurs options** *
Plusieurs réponses possibles.

- [ ] The language of writing including grammar, vocabulary....
- [ ] Organization of the research article into sections
- [ ] Organization and flow of ideas inside the sections
- [ ] Logical and clear arguments
- [ ] Autre : _____

13. **Which step of the publication process do you find challenging ? Quelle étape de la procédure de publication trouvez-vous trés difficiles? (vous pouvez choisir plusieurs options**
Plusieurs réponses possibles.

- [ ] Writing the first version of the article
- [ ] Revising the article after receiving the reviewer report
- [ ] Corresponding with the reviewer
- [ ] Autre : _____

14. **Which section(s) of your academic paper(s) need(s) most revisions based on editors/reviewers' comments ? Quelle section de votre article a besoin de plus de revisiobn selon les commentaires des éditeur\réviseurs?**
Plusieurs réponses possibles.

- [ ] Abstract
- [ ] Introduction section
- [ ] Methodology sectino
- [ ] Results Section
- [ ] Discussion section
- [ ] Bibliography
- [ ] Autre :

Section Three: Articles' rhetorical structure: Awareness and challenges

15. **Explain how much difficulty you experience in writing the following sections of research articles ? Quele est le degré de la difficulté avez-vous dans la rédaction des sections suivantes de vos articles de recherche?** *
Une seule réponse possible par ligne.

	None	A little	Quite a lot	A lot
Abstract	◯	◯	◯	◯
Introduction	◯	◯	◯	◯
materials and methods	◯	◯	◯	◯
Results	◯	◯	◯	◯
Discussion	◯	◯	◯	◯
Bibliography	◯	◯	◯	◯

16. **When writing an abstact, what elements do you include? En rédigeant un abstract , quels sont les éléments que vous introduisez?** *
Plusieurs réponses possibles.

- [ ] establishing the topic(introduction)
- [ ] Review of Literature
- [ ] Research questions/Hypothesis(es)
- [ ] Statement of the purpose
- [ ] Description of methodology
- [ ] Announcement of results
- [ ] Discussion
- [ ] Conclusion
- [ ] Implications

17. **Explain how much difficulty you experience in writing the following elements of the abstract. Quele est le degré de la difficulté avez-vous dans la rédaction des sections suivantes de l'abstract ?** *

Une seule réponse possible par ligne.

	None	A little	Quite a lot	A lot
topic establishement(introduction)	◯	◯	◯	◯
statement of the purpose	◯	◯	◯	◯
Description of methodology	◯	◯	◯	◯
Announcement of results	◯	◯	◯	◯
Discussion,conclusion, implication	◯	◯	◯	◯

18. **When writing an introduction , what elements do you include? En rédigeant une introduction , quels sont les éléments que vous introduisez?** *

Plusieurs réponses possibles.

- ☐ Stating research topic
- ☐ Reviewing previous research/ Review of literature
- ☐ Focusing on a weakness in previous research
- ☐ Raising a question
- ☐ Stating the objective of the study
- ☐ Describing the research procedure
- ☐ Presenting results
- ☐ Indicating paper structure
- ☐ Detailing the source of materials
- ☐ Stating limitations
- ☐ Autre :

19. **Explain how much difficulty you experience in writing the following elements of the introduction. Quele est le degré de la difficulté avez-vous dans la rédaction des sections suivantes de l'introduction?** *

Une seule réponse possible par ligne.

	None	A little	quite a lot	A lot
Stating research topic	◯	◯	◯	◯
Reviewing previous research/ review of literature	◯	◯	◯	◯
Indicating a weakness in previous research	◯	◯	◯	◯
Raising a question about previous research	◯	◯	◯	◯
Stating the purpose of the study	◯	◯	◯	◯
Describing the research procedure or summarizing methods	◯	◯	◯	◯
Presenting research questions or hypothesis	◯	◯	◯	◯
Presenting findings	◯	◯	◯	◯
Indicating paper structure	◯	◯	◯	◯

20. **When writing methodology section, what elements do you include? En rédigeant la section de la méthodologie, quels sont les éléments que vous introduisez?** *

Plusieurs réponses possibles.

- [ ] Describing materials used in the research (list of materials+ source of the materials
- [ ] Describing the experimental procedures
- [ ] Giving details about the equipments used in the research
- [ ] Describing statistical procedures
- [ ] Stating limitations
- [ ] Summarizing results
- [ ] Autre : _____

21. **Explain how much difficulty you experience in writing the following elements of the methodology section Quele est le degré de la difficulté avez-vous dans la rédaction des sections suivantes de la section de methodologie ?** *

Une seule réponse possible par ligne.

	None	A little	Quite a lot	A lot
Describing materials used in the research (list of materials+ source of the materialse	◯	◯	◯	◯
Describing the experimental procedures	◯	◯	◯	◯
Giving details about the equipments used in the research	◯	◯	◯	◯
Describing statistical procedures	◯	◯	◯	◯

22. **When writing results section, what elements do you include? En rédigeant la section des résultas de recherche, quels sont les éléments que vous introduisez?** *

Plusieurs réponses possibles.

- [ ] Announcing results
- [ ] Consolidating results
- [ ] Suggesting further research
- [ ] Restating the purpose, research questions, hypothesis
- [ ] Commenting results (explanation and interpretation)
- [ ] Stating limitations
- [ ] Evaluating results
- [ ] Autre : _____

23. **Explain how much difficulty you experience in writing the following elements of the results section Quelle est le degré de la difficulté avez-vous dans la rédaction des sections suivantes de la section du resultas?** *

Une seule réponse possible par ligne.

	None	A little	Quite a lot	A lot
Announcing results				
Restating the purpose, research questions, hypothesis				
Commenting results (explanation and interpretation)				

24. **When writing the discussion section, what elements do you include? En rédigeant la section de la discussion, quels sont les éléments que vous introduisez?** *

Plusieurs réponses possibles.

- [ ] Report previous research to understand the present one and describe the relation between them
- [ ] Restate methodology issues
- [ ] State selected findings
- [ ] Compare the research results with results of previous studies
- [ ] Explain differences in findings
- [ ] Make generalization from the results
- [ ] State limitations of the study and suggest further research
- [ ] report results
- [ ] Autre :

25. **Explain how much difficulty you experience in writing the following elements of the discussion section Quelle est le degré de la difficulté avez-vous dans la rédaction des sections suivantes de la discussion?** *

Une seule réponse possible par ligne.

	None	A little	Quite a lot	A lot
Reporting previous research to understand the present one and describe the relation between them				
Restating methodology issues				
Stating selected findings				
Comparing the research results with results of previous studies				
Explaining differences in findings				
Making generalization from the results				
Stating limitations of the study and suggest further research				

26. **When writing the conclusion section, what elements do you include? En rédigeant la section de la conclusion, quels sont les éléments que vous introduisez?**

Plusieurs réponses possibles.

- [ ] summarizing the study
- [ ] presenting statistics
- [ ] evaluating the study
- [ ] Indicating limitations
- [ ] drawing implications
- [ ] suggesting further research
- [ ] Autre :

27. **Explain how much difficulty you experience in writing the following elements of the conclusion Quelle est le degré de la difficulté avez-vous dans la rédaction des sections suivantes de la conclusion?**

Une seule réponse possible par ligne.

	None	A little	Quite a lot	A lot
summarizing the study	◯	◯	◯	◯
Evaluating the study	◯	◯	◯	◯
Evaluating methodology	◯	◯	◯	◯
recommending further research*	◯	◯	◯	◯
Drawing implications	◯	◯	◯	◯

28. **What are the main difficulties you face in writing the bibliography section(list of refrences)? quelles sont les principales difficultés rencontrez-vous en rédigeant la bibliographie (la liste des références)?**

Plusieurs réponses possibles.

- [ ] The lenghth of the bibliography (short, long.....
- [ ] Consistency in writing journals names and books titles (e.g. abbreviations
- [ ] adapting refrences to the style of the journal
- [ ] forgetting to mention some refrences
- [ ] The bibliography is not up to date
- [ ] Autre :

29. **What do you think about including English for Professional Academic Purposes (EPAP) in the doctoral program curricula? Que pensez-vous de l'introduction de l'anglais academique professionnels dans les curricula du programmes doctoral?** *

Une seule réponse possible.

- ◯ Obligatory
- ◯ Optional
- ◯ No idea

30. **Explain your choice**

Thank you
SLAIM Somia
Doctoral researcher
University of Sétif

Appendix D

Sciences' Teachers' Interview

1. Which part(s) of the publication process do you find challenging and why?

2. When writing for scholarly publication, which section of the article do you find the most challenging and why?

When writing for scholarly publication, which section of the article do you find the least challenging and why?

3. What are the difficulties do you face when writing a Research article?

4 .How do you overcome the challenges?

5. How have you learned how to write for scholarly refereed journals?

6. How did you write the first Research article addressed to a scholarly refereed journal?

7. What are the different stages you went through during writing your research articles?

8. How did you organize the different sections of your articles?

9. Do you refer to other people during writing and why?

10. What are the main reviewers' reports' comments about?

11. How do you revise the different parts of the research article?

12. Is there anything else you would like to add?

Appendix E

Transcription of Sciences Teachers interview

Teacher A

Which part of the publication process do you find challenging and why?

among my most serious problems in writing research is structuring the article, how to present my information, my results, and the language problem was also serious for me . The problem of language is serious in Algeria; I do not mean the general English, but I mean technical English because there is big difference between someone who masters the language and another person who masters the methodology. The problem of language was the result of the quality of instruction we have received in the period of preparing the MA degree. We have not received any kind of training concerning writing research; the problem was even worse; our teachers were trained in Europe (Russia) where they used to write short research papers that do not follow the international conventions of writing research. For non discoursal problems, we have the problem of the supervisor's luck of guidance, financial support from the government , and the last problem is the tasks the teacher is obliged to do like preparation of lessons especially when he is given new modules to teach each year. In fact, I spent three years to finish writing my first article; we have to take in consideration the time I spent in finding the research area to work in , the research problem to be covered in the study. The strategy that proved to be efficient is proposing master topics that go under the same research axes of my area to work simultaneously with students. I spent two years to master my research tools and methods and to find my research problem. Meanwhile, I was reading about the topic and learning the structure of research articles. Reading research article helped me in being introduced to the notion of research articles , its sections, and its structure.

you mean that you have learnt about the structure of research articles simultaneously with reading about the topic?

yes, no one has introduced us to the notion of RAs, but we learnt it ourselves though it is very important. Contrary to that, our students nowadays are getting help from their supervisors for writing articles; the philosophy of the obligation of writing for publication has been already acquired. For my case, my supervisor did not provide me with any kind of help, so the lack of supervision is also a big obstacle for the publication.

When writing for scholarly publication, which section of the article you do you find the most challenging?

I think that the introduction is the most difficult section to write because I find myself explaining my ideas philosophically instead of being scientific. The introduction section took me too much time to write because I was obliged to summarize all my ideas in a short section; I had also problems in deciding what kind of references to include ; thanks to my colleagues who helped me in writing my articles. At the beginning, I used to write long introductions that can even exceed 5 pages ; the information were available but molding the introduction was difficult.

You mean that structuring the introduction was difficult?

Yes, this made me spend much time on writing the introduction as I wanted to put all the information I have in the introduction. The idea that I would also bear in mind is that for introduction writing, you need to include much references as they have a significant role in this section. Materials and methods section is also an important section that goes hand in hand with the introduction. Reading and including good references means using good methods and writing a rich materials and methods section.

When writing for scholarly publication, which section of the article you do you find the least challenging?

The discussion section for me is the easiest to write I just need to compare my results with references ii cited in the introduction.

How did you learn to write for scholarly publication?

The motive was simply graduation , I wanted to graduate, so I started first by finding my research are or axe; in fact, I am the only researcher in Algeria who is working on this axe , and I have proved this through seminars

How did you overcome the difficulties in writing research?

It was through the help of my colleagues and reading articles that helped me in learning their structure. My problem at the beginning was my habit to read and take notes without taking references information in consideration, and then I had the problem of language. Translators who are In the market are linguists; they do not master the technical side of the language. I remember that I translated my first article with the help of my colleagues and a translator, yet when I sent it to a journal, the editor recommended language refinement before sending the article to reviewers .Later when I refined the language of the article, I was obliged to send the article to another journal with a lower impact factor for time limits. The second journal accepted the article without sending any comments. In fact the reviewer asked for more information and explanation about the article analysis procedure as he liked the work.

Teacher B

Which part of the publication process do you find challenging and why?

The first problem to be raised is the language, as engineers, we were structured in French**;** therefore, writing for international journals in English was not easy as the language recommended should have high standards. My problem at the beginning is that I was writing in English but thinking with the structure and conventions of the French language. At the beginning we write in French and we translate to English but keeping the same structure of research articles written in French. The second problem was the choice of the journal; it goes between ambitions of publishing in prestigious journals and the desire of graduating and being a doctor. For the content of the article, it was not a real problem because we carry an experimental work adopting a given approach. It is all about how to write in English and which journal you should publish in. after some experiences the researcher can decide about the choice of the journal , but the more specialized the journal is, the more remarks you get about the topic.

When writing for scholarly publication, which section of the article you find most challenging and why?

The discussion section because you need to discuss your results in English , you have to divide your work in an organized way ; you put your results in tables and graphs and use the language to explain things that do not appear in them; generally, they are philosophical notions , and here come s the problem. It is not easy to discuss theoretical things in English; you are supposed to convince the reader about the work and to achieve this, the language plays a vital role.

Which section do you find the least challenging?

I guess that research setting and acknowledgement are the easiest because it is just about stating information in short, direct sentences.

How do you overcome the challenges?

At the beginning I used to spend much time, but later I learnt my lesson. No one helped me in that but the experience of writing which taught me how to write for scholarly publication. I tried to use soft-wares for translation but the meaning was different, and it was not convincing. I asked for colleagues' help, but they apologize. Therefore, I was obliged to write myself; I started writing in French but follow the structure and conventions of articles written in English. Then I gave my article to my supervisor and colleagues to help me in the translation. Much of the article has been translated by a fiend I Tunisia who had experience in research publication. Then I submitted the article to a prestigious journal with a high impact factor. I received the reviewers' reports; this time I was obliged to do the necessary modifications myself. I used software for translation, and the article was edited and proofread by a teacher of English. Finally, the article was accepted, and this experience gave me the courage to write more articles.

What are the different stages you went through during writing your research articles?

I write in French but the structure is following the English language conventions; then I just translate words using software. At the end, I give my articles to a language specialist to proofread and edit the manuscript.

How did you organize the different sections of your articles?

A reviewer taught me the articles' structure, but before that I used to follow articles that were written in French. Since I was a young researcher, I tried at the beginning to put all my information in one article, and a reviewer responded that the article is not a lecture; instead he asked me to enrich my materials and methods and my discussion sections. At the time, the changes were major modifications (it was the second article to write). After many articles, I feel that I have enough experience to write in English, yet the problem of functional words like the use of articles and prepositions always exists.

Do you refer to other people during writing and why?

Yes, my supervisor has helped me; I have a colleague in Tunisia who has really helped me in research writing because they have more experience than me in publishing.

What are the main reviewers' comments about?

Editing, they keep asking for referring to a native speaker, yet if the reviewer is a specialist, he gives comments about technical aspects but no comments concerning the structure.

Teacher C

Which part of the publication process do you find challenging and why?

It is the choice of the journal; you have to find a journal that exists in the ministry platform, it should be indexed, and it should be in your research area.

When writing for scholarly publication, which section of the article do you find most challenging and why?

It is the introduction because you need to translate all your ideas and objectives into a short passage written in English. Language and structure of the introduction are difficult ; in the thesis you have enough space to write about your work, yet in the article, you have to say much things in a limited number of words.

When writing for scholarly publication, which section of the article do you find least challenging and why?

The results section because it takes the form of tables and statistics; generally they are ready before writing the article, so you need just to copy- paste them.

What are the difficulties you face when writing a research article?

The structure, because I need to adapt my information to the journal guidelines and the organization and flow of ideas. In the bibliography, the problem that was raised is in the choice of references to be cited especially when you have many researchers adopting the same position towards a given idea. The problem is also raised in the discussion section when comparing between my results and results obtained in previous studies.

How do you overcome the challenges?

First, I opened a file for each section in the article; I put all information related to each section in its file using the Arabic and French languages. Then I started translating using dictionary or Google translate.

How have you learnt to write for refereed journals?

I learnt from colleagues, who published articles before me, and for my case for the first article, I asked a colleague who have published in the same journal to provide me with the necessary information concerning the guidelines, so I avoided the maximum comments I could.

How did you write the first article?

I chose a part of my thesis about which I have ready results; then I started contacting colleagues to help me in the translation and structure of the article.

How did you organize your research article sections?

I just followed the structure and organization of articles I read before.

Have you sought help from other people?

Interviewee: Yes, I asked for the help of my colleagues in writing, and my supervisor carried te last revision when I finished the article before submitting it.

What are the main reviewers' reports' comments about?

They sent me the journal guidelines to follow them.

Teacher D

Which part of the publication process do you find challenging and why?

Before doing anything, the most difficult step is to fix the objective of the work you want to publish, then comes the preparation of the equipments. The last step is writing the article which I consider easier than those steps.

When writing for scholarly publication, which section of the article you find most challenging?

The discussion is the most difficult section because after carrying the experiment , you come to state your results; whatever results you obtain, you have to explain them ; in some cases, you need to read many articles to find an explanation to your results . Therefore, stating results is easy, but the problem lies in the explanation and justification of those results.

When writing for scholarly publication, which section of the article you find least challenging?

The methodology section(materials and methods) because you need just to state things that you have already done in your experiment.

What are the difficulties do you face when writing a Research article?

It is the bibliographical research; in many cases we could not find references that help in explaining our results. The problem that I also have is the translation because I writr in French and translate to English.

How do you overcome the challenges?

I write my articles in French and translate them to English. At the beginning, I used to find problems because of the difference in the language structure like tenses because in French we have many tenses unlike the English language, but with time we got used to the procedure of translation.

What about the structure?

It is the same I French and English.

How have you learned how to write for scholarly refereed journals?

my first article was before getting my MA degree. I was a member in a scientific laboratory; I noticed other researchers publishing articles and participating in conferences and seminars, so I wanted to imitate them; I was influenced by the environment. Then when I graduated, I was obliged to publish articles.

How did you write the first Research article addressed to a scholarly refereed journal?

My first article was in French, before getting my Ma degree; I published it in the university journal as they obliged us to publish articles before the graduation; I took a small part of my thesis and transformed it to a research article. In fact, my first three articles were in French.

What about your first article written in English?

It was four years later; I decided to write in English because of the bad experience I had with French journals. I waited three years for an article to be published, so I decided to start publishing and writing in English. I wrote my article in French and with the help of my Google

translation, I arrived at translating it. When revising my article, whenever I feel that given information is not expressed adequately, I read more articles to write better. At the end, I contacted a colleague who masters English; he recommended some modifications. The article later went through four revisions after submitting it to the journal.

How did you organize the different sections of your article?

I did not have problems because I already have experience in publishing in French; the main problem was the language.

Do you refer to other people during writing and why?

I wrote the articles in French myself, yet I sought the help of my colleagues when translating to English to edit my articles.

Are the main reviewers' reports' comments about?

They were about the language like structure of sentences and grammar mistakes.

I also received comments about the structure of the sections of the articles like the methodology description or results section; they asked for more information.

Researcher: How do you revise the different parts of the research article?

As I have said, they were language mistakes, so I corrected them myself and followed the journals guidelines to add and omit things.

Teacher E

Which part(s) of the publication process do you find challenging and why?

Revisions of the articles after receiving the reviewers' reports is the most difficult

Because you cannot expect what kind of revisions you are asked to do , sometimes they ask you to omit parts of the results or change some references because they are not up to date ; it is not easy to replace a reference with another one ; some revisions are illogical .

When writing for scholarly publication, which section of the article do you find the most challenging and why?

Interviewee: the discussion section. In fact, Iam working on an emerging research area and it is not an easy task to find references that are similar to my study to compare my results with them.

When writing for scholarly publication, which section of the article do you find the least challenging and why?

The introduction, materials and methods and results because the content is ready , you need just to report it.

What are the difficulties do you face when writing a Research article?

The language is our biggest problem because we were not instructed in English.

How do you overcome the challenges:?

I write and structure my articles in Arabic and give them to a colleague in the department of architecture to translate them; he is a professor and used to publish articles in English. I just provide him with the necessary technical terminology and the rest is his job. He also corresponds with the reviewers and do the necessary modifications under my guidance.

How have you learned how to write for scholarly refereed journals?

Through reading articles, when reading articles, I pay attention to the structure, and later I just imitate them.

How did you write the first Research article addressed to a scholarly refereed journal?

This was before knowing the professor in the department of architecture; I wrote it with the help of my colleagues and my sister who was a student of translation. One of my colleagues, who is a professor and used to publish articles, helped me in editing the article . It was very difficult, and I spent a year revising the article; it went through 5 revisions. My supervisor also helped me in revising the article for the last time before submitting it for publication.

What are the main reviewers' reports' comments about?

It depends, at the beginning they did not understand the research method I was using, so they asked for clarifications. Later with other articles, the comments are mainly about language structure and references; they ask for changing references.

How do you revise the different parts of the research article?

I ask for the help and guidance of my colleagues. On the whole, I did not receive many comments about the language as I always revise the language of the articles before sendin them.

Teacher F

Which part(s) of the publication process do you find challenging and why?

First, the choice of the topic is a challenge**;** the test protocols, the lack of products and equipments are also a big obstacle in writing for research and thinking about publication. Next, the difficult step is writing the first version of the article; adapting to journal guidelines is also difficult. When sending an article to a given journal, and you get it rejected; you get obliged to submit it again to another journal with a lower impact factor or it may not have an impact factor. In this case you get it automatically accepted.

When writing for scholarly publication, which section of the article do you find the most challenging and why?

The introduction and discussion. In the introduction you pave the way for the reader and grab his attention. If the introduction is not well written and well structured, the reader will not finish reading the article. For the discussion, it is not easy to find studies similar to your studies to discuss your results.

When writing for scholarly publication, which section of the article do you find the least challenging and why?

Materials and methods because the practical is already prepared; you write the protocols of your tests before starting the experiment; this is done in English through the works that you have already read. When you come to write the final article, you just cop down the protocols that you have already prepared. The same applies for the results section.

What are the difficulties do you face when writing a Research article?

My main problem is with the practical part; I do not have problems with the language or structure of articles simply because I read thousands of research articles in English, so I can write in English, and I learnt the structure through reading articles**.** I acquired technical terminology, scientific English and structure through my readings. I do not use software to translate; I wrote my articles myself without the help of any one.

How did you write the first Research article addressed to a scholarly refereed journal?

I started by writing materials and methods section; then I wrote the results section as they were ready after carrying the experiment in the laboratory. The abstract was easy as I selected information and copied them. I left the introduction and the title to the end because when you write the whole article, you can write the title that reflects the content of the article.

How did you organize the different sections of your articles?

No, I write them myself; in some articles, I was co-author; In this case, I help my colleagues in the laboratory, but I do not help in writing the article.

What are the main reviewers' reports' comments about?

They were about writing references; I wrote references in wrong way. They also asked me in an article to enrich my results section with more data.

How do you revise the different parts of the research article?

I corrected the references. For the other comment, since I did not have enough data to add, I chose to change the title and make it more general and other tying mistakes I corrected.

Appendix F

The List of Articles' Websites

http://www.sciencedomain.org/

Article 3:

http://www.journalrepository.org/media/journals/JPRI_65/2018/May/Boudoukha2232018JPRI40726.pdf

Article5 :

http://www.journalrepository.org/media/journals/ARRB_32/2018/Jan/Djarmouni_2262017ARRB39084.pdf

Article 6:

http://www.journalrepository.org/media/journals/ARRB_32/2017/Dec/Merghem2142017ARRB38608.pdf

Article 8:

http://www.journalejmp.com/index.php/EJMP/issue/view/2548

Article 9 :

http://www.journalair.com/index.php/AIR/article/view/18620

Article 10 :

http://www.journaljeai.com/index.php/JEAI/article/view/714

Appendix G

Research Article 15 First Version

Abstract

In this study, vegetation and land cover change were investigated in order to understand the nature and dynamic of changes occurred in the National Park of El-Kala (Algeria) between years 2002 and 2013. Landsat images, remote sensing techniques and GIS tools were the key elements to achieve this study.

The 2013 NDVI image wassubtracted from the 2002 one, and the resulting NDVI differencing image was classified into three categories: positive, negative and no change. Assessment was satisfactory with an overall accuracy of 98.14% and Kappa coefficient of 0.97. Areas affected by vegetation loss are mainly found in the east and south part of the park, whereas areas with vegetation gain are located around water bodies. Regarding land cover change, two unsupervised classifications were applied and seven land cover classes were defined in both images. Based on field knowledge and statistics' comparison, land cover classes affected by areas' decrease are Dense forest (-0.96 %), Uncultivated land (-3.99 %) and Barren land (-6.56 %). In contrast, land cover classes with positive change are: Water body (+2.01 %); Open forest (+4.93 %), Cultivated land (+4.45 %) and Urban (+3.66 %). The main causes for these changes are: Expansion of urban tissue and new infrastructures, degradation of dense forests due to human pressures mainly grazing and clearing, intensification of agriculture activities with uncontrolled irrigation and last but not least, forest fires in summers due to long droughts periods and holiday rush.

Key words: Change Detection, NDVI Differencing, Vegetation, Land Cover, National Park of El Kala

Introduction

The Mediterranean basin includes some of the highest levels of plant diversity of any region on Earth (Allen, 2003). According to Medail and Quézel (1999), 10% of higher plants can be found in the Mediterranean which represents only 1.6% of the Earth's surface and 10.8 species every km^2. However, in the last decades, the expansion of cultivated areas at the expense of forests indicates significant ecological alterations due to deforestation and the break-up of the natural equilibrium between cultivation, grazing and forestry (Kosmas *et al*., 2002).

Land cover in many regions all over the world is facing considerable and rapid changes, especially in areas where there is a high anthropogenic pressure. These changes are mainly expressed through dramatic urban expansion, agricultural intensification, conversion of natural vegetation to agricultural crops and exploitation of forest resources. Changes in land cover result in changes in radiance values caused by others factors such as differences in atmospheric conditions, in soil moisture and differences in sun angles (Singh, 1989; Mas, 1999). Land cover changes can be used to describe changes in urban settlements and vegetation patterns as an important indicator of urban ecological environments (Peijun *et al*., 2010). Furthermore, land cover changes are key drivers of changes in biodiversity at global, national and local scales (Haines-Young, 2009). Algeria, like many developing countries is prone to increased land cover changes caused by extensive cultural practices, urbanisation patterns and other anthropogenic factors, mainly grazing and clearing.

One of the major applications of remotely-sensed data is change detection because of repetitive coverage at short intervals and consistent image quality. It is useful in land use change analysis, monitoring of shifting cultivation, assessment of deforestation, and other environmental changes (Singh, 1989).

Change detection has become a useful approach for scientists to observe changes in vegetation and land cover over large areas. This concept is based on the comparison of differences in the spectral and temporal characteristics of satellite images taken at different times, to identify whether any changes have occurred in the landcover. According to Jensen (1996), the fundamental assumption of change detection is that the

difference between spectral responses of the same area will be large if land cover has changed between two dates.

Different techniques are used therefore depending on the purpose of each study, such as post classification comparison; principal components analysis; change vector analysis; temporal image differencing and rationing (Lillesand *et al*., 2008).

A common approach widely used for quantifying changes in land cover involves comparison between two independently classified imagery data (Singh, 1989; Lasanta and Vicente-Serrano, 2012). The so-called post classification comparison (PCC) method offers the advantage to allow the production and the update of GIS databases, as class/categories are given, and quantitative values of each class can be determined (Fichera *et al*., 2012).

In vegetation studies, the ratios, commonly known as vegetation indices, have been developed for the enhancement of spectral differences on the basis of strong vegetation absorbance in the red and strong reflectance in the near-infrared part of the spectrum (Singh, 1989). The most widely used vegetation index is the Normalized Difference Vegetation Index (NDVI) (Feoli, *et al*., 2003)

According to Lillesand *et al.*, (2008), the NDVI helps compensate for changing illumination conditions, surface slope, aspect, and other extraneous factors. It is used also for investigating numerous phenomena such as vegetation seasonal dynamics, leaf area index, biomass estimation and percentage ground cover determination. The NDVI is calculated according to the formula: NDVI = (NIR- R) / (NIR + R), where NIR is the near infra-red response for a given pixel and R is the red response (Jensen, 1996).

NDVI indicates presence or absence of vegetation and its intensity. Therefore, its comparison may provide information on quantitative and qualitative changes in land cover, given that vegetation is the primary indicator of land cover and its (Alphan and Derse, 2013). This analysis is carried out by applying image differencing, which is the most widely used technique for change detection. It is based on the subtraction of the digital pixel values of an image from one date from the corresponding pixel values for a different date (Singh, 1989).

The objective of this study is to analyse vegetation and land cover change in the National Park of El Kala, northeast Algeria. NDVI images were derived from two Landsat images taken in years2002 and 2013. A NDVI differencing technique was used in a GIS environment to produce an NDVI differencing map. In a second step, two unsupervised classification were applied to produce land cover maps corresponding to the 2002 and 2013 images. The resulting land cover classes were quantified and compared. This allowed determining the major causes of changes that occurred in the study area.

Materials and methods

Study area

The National Park of El Kala is situated in the extreme Northeast of Algeria, bounded by the Mediterranean sea to the North and Tunisia to the East, and lies between 36°55' to 36°90'N and 08°16' to 08°43'E (Fig. 1). The park covers an area of around 76438 ha, where 140000 habitants live. The landscape is typically Mediterranean with varied ecosystems, including a mosaic of evergreen sclerophyllous forests, lakes, mountains, scrubs, coastal and marine areas. The park is well known for its unique wetland network, from which two are on the RAMSAR list of wetlands of international importance. Furthermore, it has been designated by the UNESCO as a Man and Biosphere reserve in 1990. The climate is Mediterranean, with mild and rainy winters, hot and moist summers. Véla and Benhouhou (2007) highlighted that the park is ahotspot for biodiversity in the Mediterranean Basin. Eight hundred and forty (840) plant species are found in the park, representing a third of the Algerian flora. Twenty seven of these species are classified nationally as rare species, 11 are IUCN Red List species and 19 endemics (Yahi *et al*., 2012). Among the existing species: *Quercus suber, Quercus faginea*, *Pinus pinaster*, *Alnus glutinosa,Erica arborea*, *Arubutus unedo*, *Myrtus communis, pistacia lentiscus,* and the Algerian rarity *Nymphaea alba* and *Nata repens*. The park is a habitat for 29 mammals, from which the rare and endangered Barbary deer (*Cervus elaphus barbarus*), jackal (*Canis mesomelas*) and wild cats (*Felis sylvestris*). Thousands of birds are found in the wetlands: purple heron (*Ardea*

purpured), marbled duck (*Marmaronetta angustiwstris)* and the very rare white-headed duck (*Oxyura leucocephala*).

Urban population is focused near the coasts (52 %), while rural population (48 %) lives in villages spread over the park area. Local economy is mainly based on agriculture, livestock and forest activities. A large influx of tourists flock the area in summers, regarding the natural potential of the park. In 2012, the number of tourists and holidaymakers was 2698365 (Directorate of Tourism of El Tarf, 2014).

Data acquisition

In this study, two satellite images were used. The first image was a Landsat 7 ETM+ acquired in 25/05/2002, and the second one is a Landsat 8 OLI captured in 16/06/2013. Both images were downloaded freely from the Global Land Cover Facility (GLCF) web page (http://glcf.umd.edu).

The acquisition dates were chosen according to the availability of data and to reduce negative impacts of plant phenology and soil humidity. Images should be obtained as close to the anniversary date and the same time of day as possible in order to reduce the effects of seasonal changes in vegetation (Mass, 1999) and minimise sun angle and seasonal difference (Lillesand *et al.*, 2008).

However, it is important to highlight that the Landsat 8 images have narrower red (R) and near infrared (NIR) bands than ETM+ images (Table 1). This is an important point to check when extracting the normalised Difference Vegetation Index (NDVI). In recent studies, it was found that when using the two sensor's data, the difference of vegetation indices comparison showed that there were subtle differences between both sensors, which demonstrated high similarity (Li *et al.*, 2014; Xu and Guo, 2014).

Google earth images, local statistics and field data were used as ancillary data in this study.

Image Preprocessing

Prior to image classification, preprocessing of remote sensed data is required. The two major techniques used in preprocessing are geometric and radiometric corrections. To enable change detection to be analysed from the satellite imagery, the data must be co-

registered and preferably matched to a map projection system (Griffiths, 1988). Jensen (1996) recommends a root mean square error (RMSE) of 0.5 pixel or better when applying geometric corrections.

For this study, the first Landsat 7 (projected on the UTM 31 system/WGS 84 datum) was used as base for image-to-image registration of the Landsat 8 image using the ArcGIS 10.1 software. Twelve (12) ground control points were used with a first order polynomial transformation and bilinear interpolation for image transformation.

Atmospheric effects were removed and images were radiometrically normalized according to the Cos (t) Model (Chavez, 1996). As the Vegetation Index (NDVI) analyses require only Red and near infrared bands, we applied atmospheric corrections to bands 3 and 4 of Landsat 7 and bands 4 and 5 of Landsat 8. Atmospheric correction parameters are provided in Table 2.

NDVI and NDVI differencing

From the two selected Landsat images, NDVI images and statistics were derived according to the formula: NDVI = (NIR- R) / (NIR + R). Then, the Landsat 8 (2013) was subtracted from the Landsat 7 (2002) to produce an NDVI difference image.

In order to distinguish vegetation change (increase and decrease) from no change, a threshold was defined. The selection of an optimal threshold should be based on the accuracy of classifying the pixels as change or no-change (Sinha and Kumar, 2013).

We evaluated the accuracy through an error matrix and the computed overall accuracy, producer's accuracy, user's accuracy and Kappa coefficient as suggested by Fung and Le Drew (1988).

Unsupervised classification

Remote sensing images provide a general reflection of the spatial characteristics for ground objects. Extraction land use or landcover map information from multispectral or hyperspectral remotely sensed images is one of the important of tasks of remote sensing technology (Halder *et al*., 2011).

For the identification of different classes related to the landcover of the study area in the two dates 2002 (ETM 7+) and 2013 (Landsat 8), we performed an ISODATA (Iterative

Self-Organizing Data Analysis Technique) unsupervised classification using ArcGis 10.1 software. Twenty five classes were generated then reclassified to seven classes in each image.

Change detection

Based on the unsupervised produced maps corresponding to the two dates, change can be derived by applying a direct comparison between classes' outcomes. Classes where changes occurred are expected to present statistics significantly different compared to classes where no change occurred and could therefore be identified (Mas, 1999)using this approach.

In order to have an overview on the land cover dynamic, areas (in hectare and percentage) of each resulting land cover class of both images were computed and compared. The change rate of change between the two dates was also computed according to the formula of Peng *et al*. (2008):

$K= ((U_b-U_a) / U_a) \times 1/T \times 100$, where K is the land cover dynamic degree; this measures the change rate of the target land cover type. U_b and U_a are the area of the target land cover at the beginning and end of the study period, respectively, and T is the study period in years.

Accuracy assessment

In our case study, the NDVI differencing and the two unsupervised classifications were assessed through and error matrix (matrix of contingency), where user's and producer's accuracies as well as the Kappa coefficient were computed using ERDAS IMAGINE 9.1 software.

Results and discussion

When applying the geometric correction, the RMSE (the root mean square error) was equal to 0.37, which isan acceptable levelofaccuracythatremainsbelowa 0.5 pixel (Fig. 2).

The two Landsat Images were radiometrically normalized according to the Cost Model (Chavez, 1996) and atmospheric effects were removed. Table 2 displays the atmospheric correction parameters.

NDVI and NDVI differencing

The two NDVI images and NDVI differencing image resulted from the subtraction of the Landsat 8 image (2013) from the Landsat ETM+ (2002) are displayed in Figures 3 a, b, c. Summary statistics of NDVI differencing values are given in Table 3.

In Figures 3 a and b, bright colours depict vegetated areas with a maximum value of 0.88 and 0.60, while dark ones show non-vegetated areas with -0.67 and -0.21 respectively in years 2002 and 2013. The brighter the colours appear, the more vegetated areas are. In general, NDVI values (maximum and minimum) in 2002 were higher than those of 2013.

In order to carry out NDVI differencing and after different trials, the threshold of ± 0.024 provided the most accurate results with an overall accuracy of 98.14% and Kappa coefficient of 0.97 (Table 4). Alternativethresholdvaluesprovided relativelythe same accuracies (data not shown). Consequently, a map of change (positive/negative) and "no change" was produced (Fig. 3 c) with NDVI values ranging from -0.854 to 0.882. Areas with value ≥ 0.024 were assigned positive change and these with values ≤ 0.024 were assigned negative change. Areas in-between are considered as areas with little or no change.

Areas with a decrease in NDVI values in red colour (loss of vegetation) are mainly found in the east and south part of the park, whereas areas with an increase in green colour (representing a gain in vegetation) are located around water bodies. In the remaining areas (light yellow), no significant change occurred.

From the NDVI differencing map and knowledge of the study area, it appears that the decrease in NDVI values (vegetation lost) are due to the following causes:

- Construction of new infrastructures especially the new highway (East-west) and the Bougous dam;
- Expansion of existing urban areas and emergence of new ones.
- Forest fires, especially near the coastline and extreme south of the park with dense vegetation and a high tourist flow.

Regarding the increased NDVI values, the major cause is the reconversion of bare lands to agriculture fields, mainly around the Oubeira Lake.

In the remaining areas of the Park, no significant or very few changes occurred.

Classification and land cover changes

From the unsupervised classification of two satellite images Landsat ETM+ (2002) and Landsat 8 (2013), two land cover maps were produced (Fig. 4 and 5) and seven classes were identified in each image, namely: Water body; Dense forest, Open forest, Uncultivated lands (including grasslands), Cultivated lands, Barren lands and Urban. Previous fieldwork and ancillary data were useful to perform these classifications. Many authors found that unsupervised classification provides similar or superior results comparing to the maximum likelihood classification (Rozenstein and Karnieli, 2011; Halder *et al.*, 2011). In our case, the accuracy assessments were satisfactory. This is in agreement with the standard overall accuracy for land cover maps which is 85% (Anderson *et al.*, 1976; Foody, 2002)

The total accuracy of the 2002 map was 85.96 % with a Kappa coefficient equal to 0.79. For the 2013 image, the total accuracy was 91.96 % with a Kappa coefficient of 0.81.

Table 5summarises statistics of the area (in hectare and percentage) of each individual defined class as well as the rate of change that occurred between the two dates, while figures 6 and 7 display the distribution of area's percentage and change rate through the land cover classes.

The resultsshowthat there is an increase of the area between the two dates in the following classes: waterbodies (from 4439.97 to 5335.74 ha), open forests (from 21125.52 to 31558.14 ha), cultivated lands (from 3875.76 to 5605.38 ha) and urban areas (from 2087.19 to 2856.96). The area decrease has occurred in dense forest (from 17397.99 to 15717.42 ha), uncultivated land (from 23248.26 to 13948.83 ha) and barren land (from 4341.51 to 1493.73 ha). It is worth noting that the most significant increase was observed in the cultivated lands (+4.45 %) followed by the urban areas (+3.66 %). Conversely, decrease occurred in barren lands (-6.56%) and uncultivated lands (-3.99%).

Regarding the water bodies, a new dam (Bougous dam) was constructed in 2005 and its completion and watering started in 2010 with a total capacity of 65 cubic hectometre

(ANBT, 2014). This contributed on one hand to an increase in the water body's area (+2.01 %) and on the other hand led to the decrease of the uncultivated and barren lands areas. The dam was constructed outside the forest's perimeter.

Dense forests globally dominated by cork oak trees (*Quesrcus suber*), Portuguese oak (*Quercus canariensis*) and maritime pines (*Pinus pinaster*) are facing growing anthropogenic pressure, especially overgrazing, where 50 to 80% of rural population lives from livestock (Homewood, 1993; Oulmouhoub, 2005). The other constraint is fire. The burned area of the District of El Tarf to which belongs the National Park, was 32.97% of the total area of the District during the period 1990-2000 and 1503 fire starts were recorded during the same period (Benderradji *et al.,* 2004). In this landcover class, the above-mentioned pressures generated a negative change rate of - 0.96 % between 2002 and 2013. The affected areas are mainly located in the extreme south, northeast and northwest parts of the park.

- The change rate of open forest class was +4.93 %. In fact, most of these forests are degraded maquis of cork oak trees, resulting from the regressive dynamic of dense forests. In other words, the depletion of dense forest's area had contributed to the increase of the open forests areas.
- The change rate in uncultivated areas is opposite to cultivated ones (-3.99% against 4.45% respectively). Conversion of uncultivated and barren lands to annual crops, forest clearing, construction of new dams and increase in population growth have contributed in the significant increase of the cultivated areas (+4.45%). This expansion was at the expense of uncultivated lands which was affected by a negative change rate (-3.99%), but also at the detriment of barren lands (-6.56 %). The 2013 year land cover map (Fig.5) shows the concentration of new agricultural fields around the dams and other water bodies, specifically Oubeira and Tonga lakes, where farmers pump directly water for the irrigation of watermelon, peanuts and tomatoes crops, and in most cases, this operation is uncontrolled.

The drastic decrease in barren lands (-65.61%) is due to different causes: The study

area, despite being a Natural park, a RAMSAR site (wetland of international importance), a Biosphere reserve recognised by the UNESCO, faces high human pressures. A highway (East-West) was constructed in the last five years within the park's area (17.5 Km long and 120 m wide) in addition to the new dams and small water reservoirs. Moreover, the urban tissue has expanded and small villages were transformed into small cities. All these factors have contributed to the negative dynamic that occurred in this landcover class.

- According to the statistics provided by the Directorate of Environment and Urban Management (2014), the current population within the park is about 140000 inhabitants and has increased from 1998 (92292) and 2002 (1194242). It is worth noting that the National Park of El Kala is considered as one of the most visited places in the country, particularly its beaches, during summer periods. As an example, the number of tourists (in the beaches) was 2698365 in 2012 (Directorate of Tourism of El Tarf, 2014). Therefore, new hotels and infrastructures grew up in the park. This reflects the positive rate of change (+3.66 %) regarding the urban landcover class.

Conclusion

The National Park of El Kala is considered as one of the most diversified ecosystems in Algeria and North Africa since there are four ecosystem types (sea, lakes, dunes, forests). It hosts a very rich flora and fauna with a high level of endemic and rare species (Skinner and Smart, 1984; Stevenson, 1988; Véla and Benhouhou, 2007). However, the demographic pressure, increasing tourist flow and agricultural activities lead to major changes in vegetation and landcover.

For a better understanding of vegetation change and landcover dynamic in the National Park of El Kala, NDVI differencing and land cover change detection analysis were carried out on a Landsat ETM+2002 and Landsat 8 OLI 2013 images.

The NDVI differencing image did separate between vegetation change (decrease and increase) and no change. The threshold technique value was successful regarding the accuracies' results (overall accuracy = 98.14% and Kappa coefficient = 0.97). However,

in order to identify and quantify changes at a land cover context, classical unsupervised classification was applied to both images.

Seven classes were defined: Water body; Dense forest; Open forest; Uncultivated lands (including grasslands), Cultivated lands, Barren lands and Urban. The overall accuracy were 99.97 and 75.96, and Kappa coefficients were 0.99 and 0.61 for 2002 and 2013 respectively.

Statistics' comparison suggest that the high land cover classes affected by area's decrease are Dense forest (-0.96 %), Uncultivated land (-3.99 %) and Barren land, which is the most pronounced (-6.56 %). In contrast, land cover classes concerned by positive change are: Water body (+2.01 %); Open forest (+4.93 %) where the highest change occurred, Cultivated land (+4.45 %) and Urban (+3.66 %).

Integrating GIS and remote sensing provided valuable information on the nature and statistics of land cover changes. Field knowledge and ancillary data helped in understanding the main causes of land cover changes that occurred between years 2002 and 2013. These could be summarised by: Expansion of urban tissue and new infrastructures such as highways and dams, degradation of dense forests due to human pressures mainly grazing and clearing, intensification of agriculture activities with uncontrolled irrigation from lakes and dams and last but not least, forest fires in summers due to long droughts periods and holiday rush.

In this study, we have applied two different techniques for investigating vegetation and land cover changes in the National Park of El Kala within 10 years period. NDVI differencing provided a global idea on vegetation change (lost and gain) and no change, whilst unsupervised classifications through statistical comparison was a useful approach to identify and quantify changed areas and their spatial distribution

Appendix H

Research Article 15 Final version

Abstract

In this study, vegetation and land cover change were investigated in order to understand the nature and dynamic of changes occurred in the National Park of El-Kala (Algeria) between years 2002 and 2013. Landsat images, remote sensing techniques and GIS tools were the key elements to achieve this study. The 2013 NDVI image was subtracted from the 2002 one, and the resulting NDVI differencing image was classified into three categories: positive, negative and no change. Assessment was satisfactory with an overall accuracy of 98.14% and Kappa coefficient of 0.97. Areas affected by vegetation loss are mainly found in the east and south part of the park, whereas areas with vegetation gain are located around water bodies. Regarding land cover change, two unsupervised classifications were applied and seven land cover classes were defined in both images. Based on field knowledge and statistics' comparison, land cover classes affected by areas' decrease are Dense forest (-0.96 %), Uncultivated land (-3.99 %) and Barren land (-6.56 %). In contrast, land cover classes with positive change are: Water body (+2.01 %); Open forest (+4.93 %), Cultivated land (+4.45 %) and Urban (+3.66 %). The main causes for these changes are: Expansion of urban tissue and new infrastructures, degradation of dense forests due to human pressures mainly grazing and clearing, intensification of agriculture activities with uncontrolled irrigation and last but not least, forest fires in summers due to long droughts periods and holiday rush.

Introduction

The Mediterranean basin includes some of the highest levels of plant diversity of any region on Earth (Allen, 2003). According to Medail and Quézel (1999), 10% of higher plants can be found in the Mediterranean which represents only 1.6% of the Earth's surface and 10.8 species every km². However, in the last decades, the expansion of cultivated areas at the expense of forests indicates significant ecological alterations due to deforestation and the break-up of the natural equilibrium between cultivation, grazing and forestry (Kosmas *et al.*, 2002).

Land cover in many regions all over the world is facing considerable and rapid changes, especially in areas where there is a high anthropogenic pressure. These changes are mainly expressed through dramatic urban expansion, agricultural intensification, conversion of natural vegetation to agricultural crops and exploitation of forest resources. Changes in land cover result in changes in radiance values caused by others factors such as differences in atmospheric conditions, in soil moisture and differences in sun angles (Singh, 1989; Mas, 1999). Land cover changes can be used to describe changes in urban settlements and vegetation patterns as an important indicator of urban ecological environments (Peijun *et al.*, 2010). Furthermore, land cover changes are key drivers of changes in biodiversity at global, national and local scales (Haines-Young, 2009). Algeria, like many developing countries is prone to increased land cover changes caused by extensive cultural practices, urbanisation patterns and other anthropogenic factors, mainly grazing and clearing.

One of the major applications of remotely-sensed data is change detection because of repetitive coverage at short intervals and consistent image quality. It is useful in land use change analysis, monitoring of shifting cultivation, assessment of deforestation, and other environmental changes (Singh, 1989).

Change detection has become a useful approach for scientists to observe changes in vegetation and land cover over large areas. This concept is based on the comparison of differences in the spectral and temporal characteristics of satellite images taken at different times, to identify whether any changes have occurred in the landcover. According to Jensen (1996), the fundamental assumption of change detection is that the difference between spectral responses of the same area will be large if land cover has changed between two dates.

Different techniques are used therefore depending on the purpose of each study, such as post classification comparison; principal components analysis; change vector analysis; temporal image differencing and rationing (Lillesand *et al.*, 2008).

A common approach widely used for quantifying changes in land cover involves comparison between two independently classified imagery data (Singh, 1989; Lasanta and Vicente-Serrano, 2012). The so-called post classification comparison (PCC) method offers the advantage to allow the production and the update of GIS databases, as class/categories are given, and quantitative values of each class can be determined (Fichera *et al.*, 2012).

In vegetation studies, the ratios, commonly known as vegetation indices, have been developed for the enhancement of spectral differences on the basis of strong vegetation absorbance in the red and strong reflectance in the near-infrared part of the spectrum (Singh, 1989). The most widely used vegetation index is the Normalized Difference Vegetation Index (NDVI) (Feoli, *et al.*, 2003).

According to Lillesand *et al.*, (2008), the NDVI helps compensate for changing illumination conditions, surface slope, aspect, and other extraneous factors. It is used also for investigating numerous phenomena such as vegetation seasonal dynamics, leaf area index, biomass estimation and percentage ground cover determination. The NDVI is calculated according to

the formula: NDVI = (NIR- R) / (NIR + R), where NIR is the near infra-red response for a given pixel and R is the red response (Jensen, 1996).

NDVI indicates presence or absence of vegetation and its intensity. Therefore, its comparison may provide information on quantitative and qualitative changes in land cover, given that vegetation is the primary indicator of land cover and its (Alphan and Derse, 2013). This analysis is carried out by applying image differencing, which is the most widely used technique for change detection. It is based on the subtraction of the digital pixel values of an image from one date from the corresponding pixel values for a different date (Singh, 1989).

In this work, NDVI images were derived from two Landsat images taken in years2002 and 2013. A NDVI differencing technique was used in a GIS environment to produce an NDVI differencing map. In a second step, two unsupervised classification were applied to produce land cover maps corresponding to the 2002 and 2013 images. The resulting land cover classes were quantified and compared. Therefore, this study aims to analysing vegetation and land cover change and determining the major causes of changes that occurred in the National Park of El Kala, northeast Algeria.

Materials and methods

Study area

The National Park of El Kala is situated in the extreme Northeast of Algeria, bounded by the Mediterranean sea to the North and Tunisia to the East, and lies between 36°55' to 36°90'N and 08°16' to 08°43'E (Fig. 1).

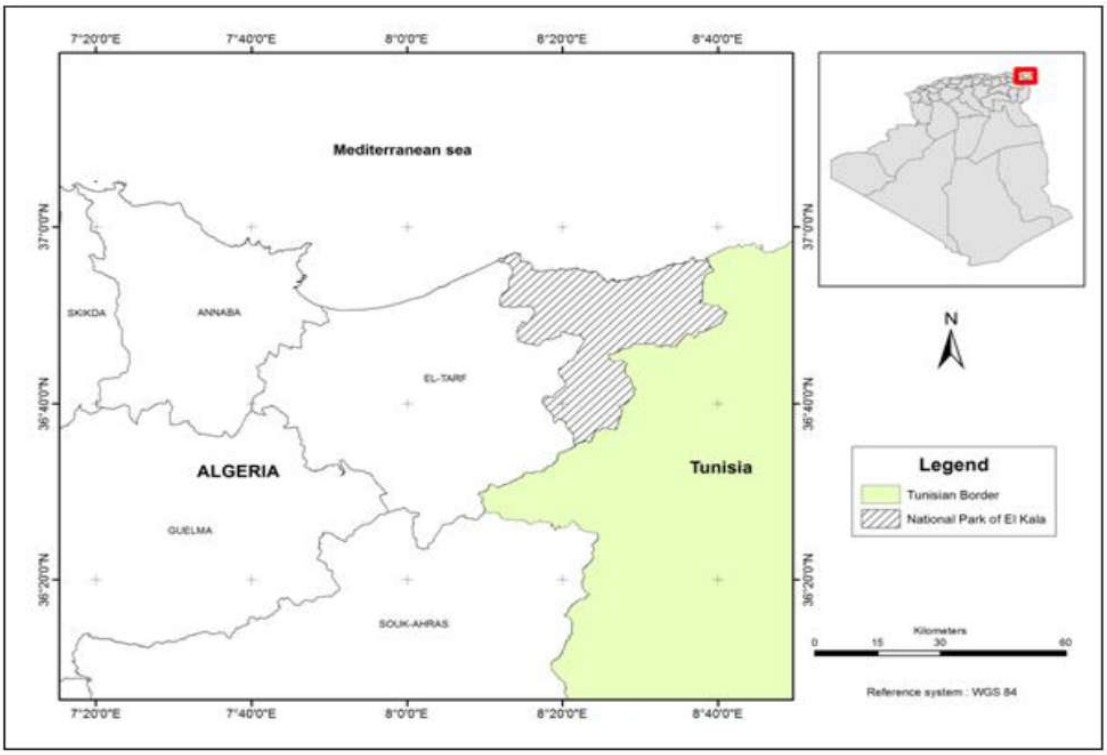

Fig. 1. Location map of the National Park of El Kala. Algeria.

The park covers an area of around 76438 ha, where 140000 habitants live. The landscape is typically Mediterranean with varied ecosystems, including a mosaic of evergreen sclerophyllous forests, lakes,

mountains, scrubs, coastal and marine areas. The park is well known for its unique wetland network, from which two are on the RAMSAR list of wetlands of international importance. Furthermore, it has been designated by the UNESCO as a Man and Biosphere reserve in 1990. The climate is Mediterranean, with mild and rainy winters, hot and moist summers. Véla and Benhouhou (2007) highlighted that the park is a hotspot for biodiversity in the Mediterranean Basin. Eight hundred and forty (840) plant species are found in the park, representing a third of the Algerian flora. Twenty seven of these species are classified nationally as rare species, 11 are IUCN Red List species and 19 endemics (Yahi *et al.*, 2012). Among the existing species: *Quercus suber, Quercus faginea*, *Pinus pinaster*, *Alnus glutinosa, Erica arborea*, *Arubutus unedo*, *Myrtus communis, pistacia lentiscus,* and the Algerian rarity *Nymphaea alba* and *Nata repens*. The park is a habitat for 29 mammals, from which the rare and endangered Barbary deer (*Cervus elaphus barbarus*), jackal (*Canis mesomelas*) and wild cats (*Felis sylvestris*). Thousands of birds are found in the wetlands: purple heron (*Ardea purpured*), marbled duck (*Marmaronetta angustiwstris)* and the very rare white-headed duck (*Oxyura leucocephala*).

Urban population is focused near the coasts (52 %), while rural population (48 %) lives in villages spread over the park area. Local economy is mainly based on agriculture, livestock and forest activities. A large influx of tourists flock the area in summers, regarding the natural potential of the park. In 2012, the number of tourists and holidaymakers was 2698365 (Directorate of Tourism of El Tarf, 2014).

Data acquisition

In this study, two satellite images were used. The first image was a Landsat 7 ETM+ acquired in 25/05/2002, and the second one is a Landsat 8 OLI captured in 16/06/2013. Both images were downloaded freely from the Global Land Cover Facility (GLCF) web page (http://glcf.umd.edu).

The acquisition dates were chosen according to the availability of data and to reduce negative impacts of plant phenology and soil humidity. Images should be obtained as close to the anniversary date and the same time of day as possible in order to reduce the effects of seasonal changes in vegetation (Mass, 1999) and minimise sun angle and seasonal difference (Lillesand *et al.*, 2008).

However, it is important to highlight that the Landsat 8 images have narrower red (R) and near infrared (NIR) bands than ETM+ images (Table 1). This is an important point to check when extracting the normalised Difference Vegetation Index (NDVI). In recent studies, it was found that when using the two sensor's data, the difference of vegetation indices comparison showed that there were subtle differences between both sensors, which demonstrated high similarity (Li *et al.*, 2014; Xu and Guo, 2014).

Google earth images, local statistics and field data were used as ancillary data in this study.

Image Preprocessing

Prior to image classification, preprocessing of remote sensed data is required. The two major techniques used in preprocessing are geometric and radiometric corrections. To enable change detection to be analysed from the satellite imagery, the data must be co-registered and preferably matched to a map projection system (Griffiths, 1988). Jensen (1996) recommends a root mean square error (RMSE) of 0.5 pixel or better when applying geometric corrections.

For this study, the first Landsat 7 (projected on the UTM 31 system/WGS 84 datum) was used as base for image-to-image registration of the Landsat 8 image using the ArcGIS 10.1 software. Twelve (12) ground control points were used with a first order polynomial transformation and bilinear interpolation for image transformation.

Atmospheric effects were removed and images were radiometrically normalized according to the Cos (t) Model (Chavez, 1996). As the Vegetation Index (NDVI) analyses require only Red and near infrared

bands, we applied atmospheric corrections to bands 3 and 4 of Landsat 7 and bands 4 and 5 of Landsat 8. Atmospheric correction parameters are provided in Table 2.

NDVI and NDVI differencing

From the two selected Landsat images, NDVI imagesand statistics were derived according to the formula:

NDVI = (NIR- R) / (NIR + R). Then, the Landsat 8 (2013) was subtracted from the Landsat 7 (2002) to produce an NDVI difference image.

In order to distinguish vegetation change (increase and decrease) from no change, a threshold was defined. The selection of an optimal threshold should be based on the accuracy of classifying the pixels as change or no-change (Sinha and Kumar, 2013).

We evaluated the accuracy through an error matrix and the computed overall accuracy, producer's accuracy, user's accuracy and Kappa coefficient as suggested by Fung and Le Drew (1988).

Unsupervised classification

Remote sensing images provide a general reflection of the spatial characteristics for ground objects. Extraction land use or landcover map information from multispectral or hyperspectral remotely sensed images is one of the important of tasks of remote sensing technology (Halder *et al*., 2011).

For the identification of different classes related to the landcover of the study area in the two dates 2002 (ETM 7+) and 2013 (Landsat 8), we performed an ISODATA (Iterative Self-Organizing Data Analysis Technique) unsupervised classification using ArcGis 10.1 software. Twenty five classes were generated then reclassified to seven classes in each image.

Change detection

Based on the unsupervised produced maps corresponding to the two dates, change can be derived by applying a direct comparison between classes' outcomes. Classes where changes occurred are expected to present statistics significantly different compared to classes where no change occurred and could therefore be identified (Mas, 1999)using this approach.

In order to have an overview on the land cover dynamic, areas (in hectare and percentage) of each resulting land cover class of both images were computed and compared. The change rate of change between the two dates was also computed according to the formula of Peng *et al*. (2008):

K= ((Ub-Ua) / Ua) ×1/T×100, where K is the land cover dynamic degree; this measures the change rate of the target land cover type. Ub and Ua are the area of the target land cover at the beginning and end of the study period, respectively, and T is the study period in years.

Accuracy assessment

In our case study, the NDVI differencing and the two unsupervised classifications were assessed through and error matrix (matrix of contingency), where user's and producer's accuracies as well as the Kappa coefficient were computed using ERDAS IMAGINE 9.1 software.

Results and discussion

When applying the geometric correction, the RMSE (the root mean square error) was equal to 0.37, which is an acceptable level of accuracy that remains below a 0.5 pixel (Fig. 2).

The two Landsat Images were radiometrically normalized according to the Cost Model (Chavez, 1996) and atmospheric effects were removed. Table 2 displays the atmospheric correction parameters.

NDVI and NDVI differencing

The two NDVI images and NDVI differencing image resulted from the subtraction of the Landsat 8 image (2013) from the Landsat ETM+ (2002) are displayed in Figures 3 a, b, c. Summary statistics of NDVI differencing values are given in Table 3.

In Figures 3 a and b, bright colours depict vegetated areas with a maximum value of 0.88 and 0.60, while dark ones show non-vegetated areas with -0.67 and -0.21 respectively in years 2002 and 2013. The brighter the colours appear, the more vegetated areas are. In general, NDVI values (maximum and minimum) in 2002 were higher than those of 2013.

In order to carry out NDVI differencing and after different trials, the threshold of ± 0.024 provided the Most accurate results with an overall accuracy of 98.14% and Kappa coefficient of 0.97 (Table 4). Alternative threshold values provided relatively the same accuracies (data not shown). Consequently, a map of change (positive/negative) and "no change" was produced (Fig. 3 c) with NDVI values ranging from -0.854 to 0.882. Areas with value ≥ 0.024 were assigned positive change and these with values ≤ 0.024 were assigned negative change. Areas in-between are considered as areas with little or no change.

Table 1. Multispectral band characteristics of Landsat 8 and Landsat 7.

Landsat 8 OLI	Wavelength (um)	Spatial resolution(m)	Landsat 7 ETM+	Wavelength (um)	Spatial resolution(m)
Band 1 - Coastal aerosol	0.43 -0.45	30			
Band 2 - Blue	0.45 - 0.51	30	Band 1	0.45 - 0.52	30
Band 3 - Green	0.53 - 0.59	30	Band 2	0.52 - 0.60	30
Band 4 - Red	0.64 - 0.67	30	Band 3	0.63 - 0.69	30
Band 5 - Near Infrared (NIR)	0.85 - 0.88	30	Band 4	0.77 - 0.90	30
Band 6 - SWIR 1	1.57 - 1.65	30	Band 5	1.55 - 1.75	30
Band 7 - SWIR 2	2.11 - 2.29	30	Band 7	2.09 - 2.35	30
Band 8 - Panchromatic	0.50 - 0.68	15	Band 8	0.52 - 0.90	15
Band 9 - Cirrus	1.36 - 1.38	30			

Table 2. Atmospheric correction parameters.

Band	L max	L min	Sun elevation (°)	Time	Date
Path/row	192/035	192/35	192/35	192/35	
3	0.620*	-5.620**	64.85	09:49	2002-05-25
4	0.639*	-5.740**	64.85	09:49	
4	9.8729	- 49.364	68.23	10:03	2013-06-16
5	5.991	- 29.954	68.23	10:03	

(*offset, **gain).

Areas with a decrease in NDVI values in red colour (loss of vegetation) are mainly found in the east and south part of the park, whereas areas with an increase in green colour (representing a gain in vegetation) are located around water bodies. In the remaining areas (light yellow), no significant change occurred.

From the NDVI differencing map and knowledge of the study area, it appears that the decrease in NDVI values (vegetation lost) are due to the following causes:

- Construction of new infrastructures especially the new highway (East-west) and the Bougous dam;
- Expansion of existing urban areas and emergence of new ones.
- Forest fires, especially near the coastline and extreme south of the park with dense vegetation and a high tourist flow.

Regarding the increased NDVI values, the major cause is the reconversion of bare lands to agriculture fields, mainly around the Oubeira Lake.

In the remaining areas of the Park, no significant or very few changes occurred.

Classification and land cover changes

From the unsupervised classification of two satellite

images Landsat ETM+ (2002) and Landsat 8 (2013), two land cover maps were produced (Fig. 4 and 5) and seven classes were identified in each image, namely: Water body; Dense forest, Open forest, Uncultivated lands (including grasslands), Cultivated lands, Barren lands and Urban. Previous fieldwork and ancillary data were useful to perform these classifications. Many authors found that unsupervised classification provides similar or superior results comparing to the maximum likelihood classification (Rozenstein and Karnieli, 2011; Halder *et al.*, 2011). In our case, the accuracy assessments were satisfactory. This is in agreement with the standard overall accuracy for land cover maps which is 85% (Anderson *et al.*, 1976; Foody, 2002).

Table 3. Statistics NDVI and NDVI differencing values.

	2002 NDVI	2013 NDVI	*NDVI Differencing*
Minimum values	-0.673	-0.214	-0.854
Maximum Values	0.881	0.607	0.882
Mean Values	0.538	0.341	-0.201
Standard deviation	0.189	0.130	0.114

Table 4. Error matrix, accuracies and Kappa coefficient of NDVI differencing.

	Ground Truth				
NDVIClasses	Negative change	No change	Positive change	Total	
Negative change	99.38	0.00	0.14	40.47	
No change	0.62	95.54	0.00	33.82	
Positive change	0.00	4.46	9.86	25.71	
Total	100	100	100	100	
Producer's Accuracy		User's Accuracy		Overall Accuracy	98.14%
Negative change	99.38%	Negative change	99.92%		
No change	95.54%	No change	99.26%	Kappa	
Positive change	99.86%	Positive change	93.90%		0.97

The total accuracy of the 2002 map was 85.96 % with a Kappa coefficient equal to 0.79. For the 2013 image, the total accuracy was 91.96 % with a Kappa coefficient of 0.81.

Table 5summarises statistics of the area (in hectare and percentage) of each individual defined class as well as the rate of change that occurred between the two dates, while figures 6 and 7 display the distribution of area's percentage and change rate through the land cover classes.

Table 5. Area and percentage of land cover classes of 2002 and 2013.

Classes	2002		2013		Change rate %
	Area (ha)	Percentage	Area (ha)	Percentage	
Water body (1)	4439.97	5.8	5335.74	6.97	2.01
Dense forest (2)	17397.99	22.74	15717.42	20.54	-0.96
Open forest (3)	21125.52	27.61	31558.14	41.24	4.93
Uncultivated land (4)	23248.26	30.38	13948.83	18.23	-3.99
Cultivated land (5)	3875.76	5.07	5605.38	7.33	4.45
Barren land (6)	4341.51	5.67	1493.73	1.95	-6.56
Urban (7)	2087.19	2.73	2856.96	3.73	3.66
Total	76516.2	100	76516.2	100	

The results show that there is an increase of the area between the two dates in the following classes: water bodies (from 4439.97 to 5335.74 ha), open forests (from 21125.52 to 31558.14 ha), cultivated lands (from 3875.76 to 5605.38 ha) and urban areas (from 2087.19 to 2856.96). The area decrease has occurred in dense forest (from 17397.99 to 15717.42 ha), uncultivated land (from 23248.26 to 13948.83 ha)

and barren land (from 4341.51 to 1493.73 ha). It is worth noting that the most significant increase was observed in the cultivated lands (+4.45 %) followed by the urban areas (+3.66 %). Conversely, decrease occurred in barren lands (-6.56%) and uncultivated lands (-3.99%).

Link

Total RMS Error: Forward:0,370151

<Link>	X Source	Y Source	X Map	Y Map	Residual_x	Residual_y	Residual
1	432541,560516	4086578,070831	432532,225342	4086574,988251	0,0363128	-0,691849	0,692801
2	434440,379333	4085782,870331	434436,181641	4085786,177673	0,0325495	-0,612242	0,613106
3	442705,539551	4085069,737701	442703,334961	4085068,830872	0,0259415	-0,472859	0,47357
4	432427,978821	4082651,450500	432427,120972	4082656,889648	0,0284719	-0,525672	0,526443
5	437022,224121	4081687,329712	437020,160522	4081686,802368	0,0223843	-0,397031	0,397662
6	442225,267639	4084092,989502	442218,193359	4084091,550293	0,0241188	-0,434197	0,434867
7	433471,404419	4076718,326111	433469,802246	4076717,526855	0,0180074	-0,303981	0,304514
8	433539,288483	4079209,240723	433533,965149	4079209,471436	0,0214507	-0,376973	0,377582
9	442307,210083	4078769,067993	442307,314453	4078772,856445	0,0150117	-0,241186	0,241653
10	460473,877258	4085198,644409	460469,397583	4085198,494263	0,0354421	-0,675324	0,676253
11	462315,003662	4086130,685120	462311,750793	4086134,640198	0,0400004	-0,771993	0,773028
12	468453,172302	4085455,891113	468453,999023	4085455,726318	0,0493364	-0,970159	0,971412

Fig. 2. GCPs used for geometric correction and RMSE.

Regarding the water bodies, a new dam (Bougous dam) was constructed in 2005 and its completion and watering started in 2010 with a total capacity of 65 cubic hectometre (ANBT, 2014). This contributed on one hand to an increase in the water body's area (+2.01 %) and on the other hand led to the decrease of the uncultivated and barren lands areas. The dam was constructed outside the forest's perimeter.

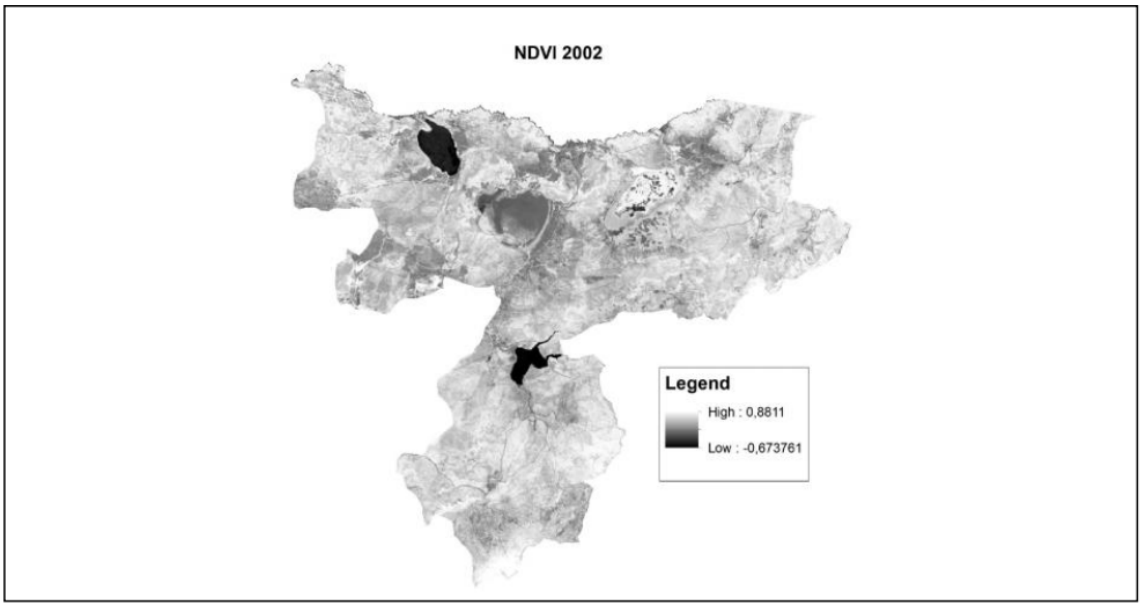

Fig. 3. a. NDVI image of 2002. Legend displays low and high NDVI values ranging from -0.67 to 0.88.

Dense forests globally dominated by cork oak trees (*Quesrcus suber*), Portuguese oak (*Quercus canariensis*) and maritime pines (*Pinus pinaster*) are facing growing anthropogenic pressure, especially overgrazing, where 50 to 80% of rural population lives from livestock (Homewood, 1993; Oulmouhoub, 2005). The other constraint is fire. The burned area of the District of El Tarf to which belongs the

District during the period 1990-2000 and 1503 fire starts were recorded during the same period (Benderradji *et al.*, 2004). In this landcover class, the above-mentioned pressures generated a negative change rate of - 0.96 % between 2002 and 2013. The affected areas are mainly located in the extreme south, northeast and northwest parts of the park.

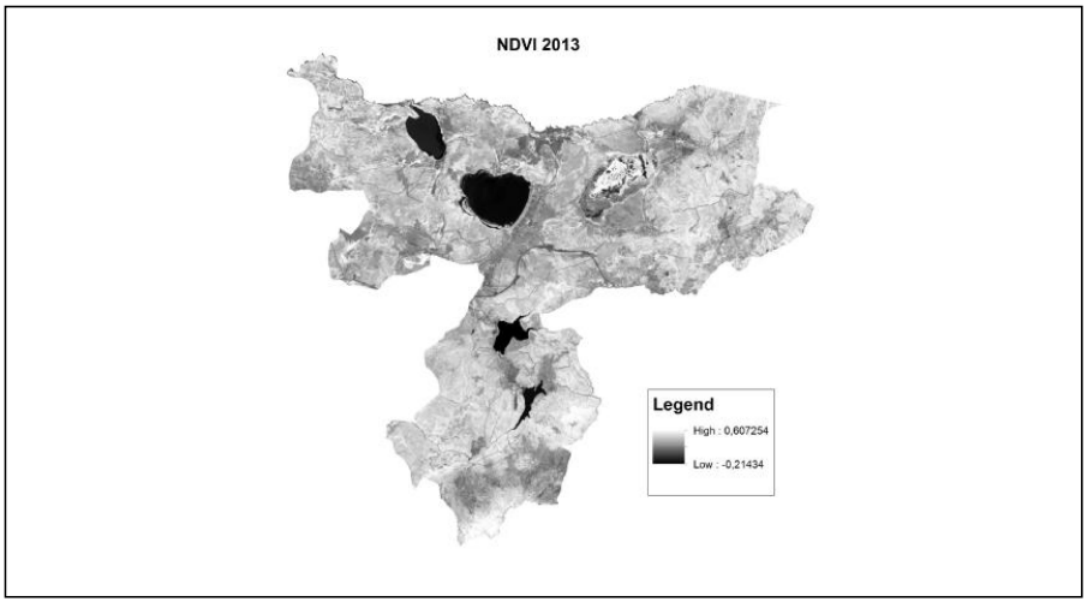

Fig. 3. b. NDVI image of 2013. Legend displays low and high NDVI values ranging from -0.21 to 0.60.

- The change rate of open forest class was +4.93 %. In fact, most of these forests are degraded maquis of cork oak trees, resulting from the regressive dynamic of dense forests. In other words, the depletion of dense forest's area had contributed to the increase of the open forests areas.

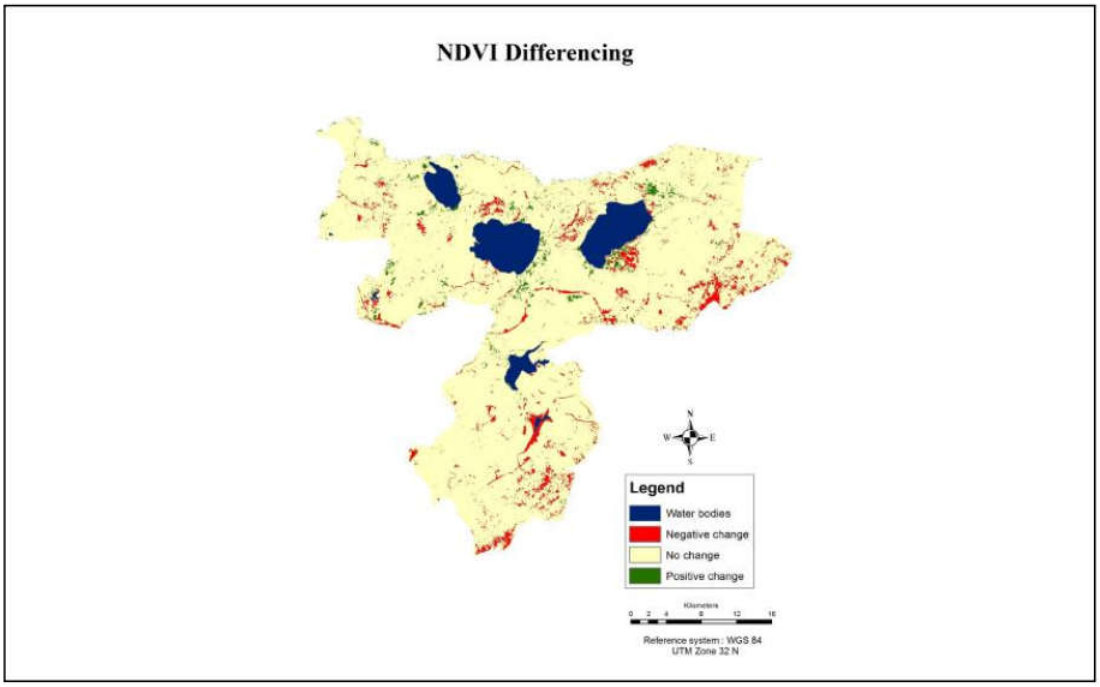

Fig. 3. c. NDVI Differencing map (2013-2002).

- The change rate in uncultivated areas is opposite to cultivated ones (-3.99% against 4.45% respectively). Conversion of uncultivated and barren lands to annual crops, forest clearing, construction of new dams and increase in population growth have contributed in the significant increase of the cultivated areas (+4.45%). This expansion was at the expense of uncultivated lands which was affected by a negative change rate (-3.99%), but also at the detriment of barren lands (-6.56 %). The 2013 year land cover map (Fig.5) shows the concentration of new agricultural fields around the dams and other water bodies, specifically Oubeira and Tonga lakes, where farmers pump directly water for the irrigation of watermelon, peanuts and tomatoes crops, and in most cases, this operation is uncontrolled.

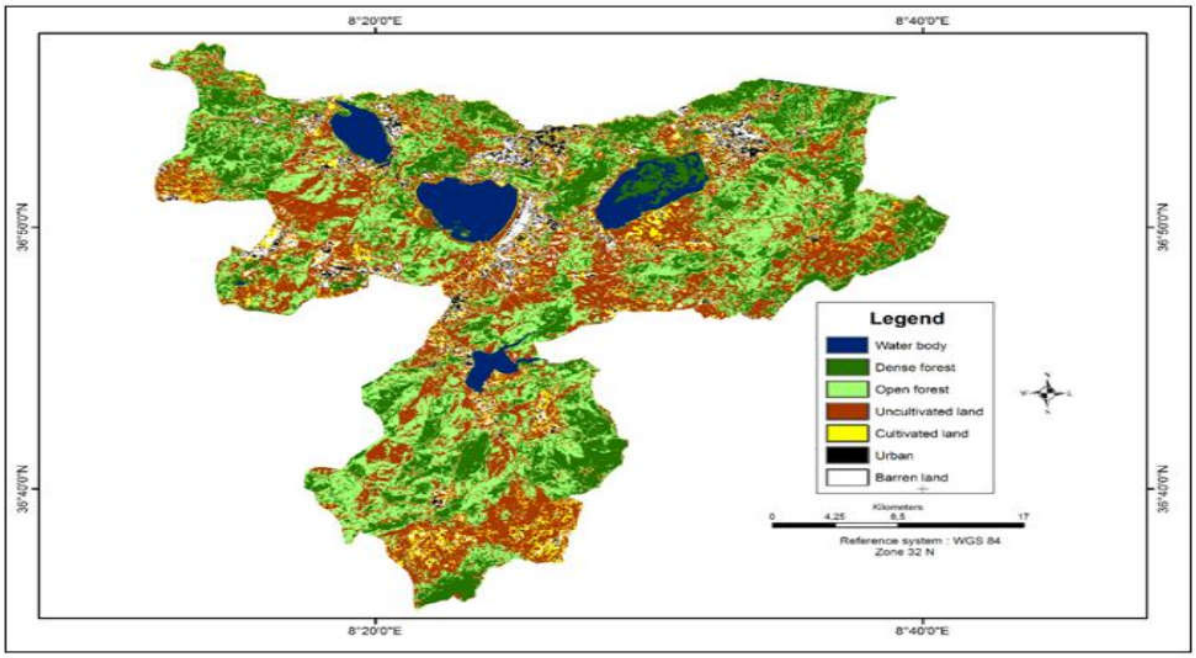

Fig. 4. Land cover map of the National Park of El Kala. 2002. The map is derived from the unsupervised classification. Landsat 7 ETM+ (2002).

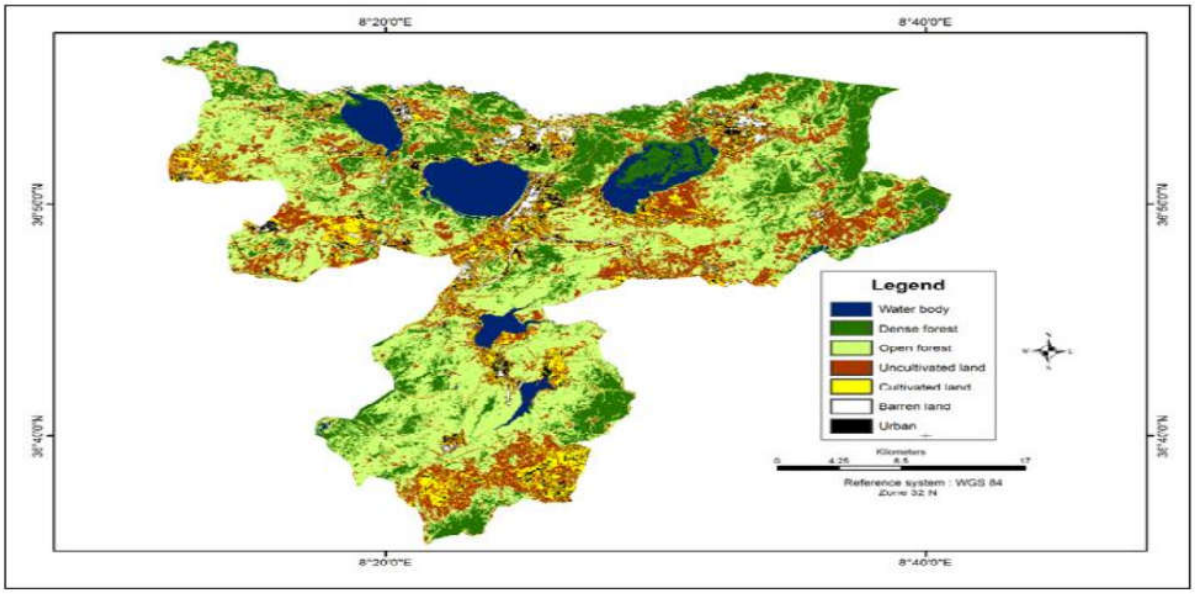

Fig. 5. Land cover map of the National Park of El Kala. 2013. The map is derived from the unsupervised. Classification Landsat 8 OLI (2013).

The drastic decrease in barren lands (-65.61%) is due to different causes: The study area, despite being a Natural park, a RAMSAR site (wetland of international importance), a Biosphere reserve recognised by the UNESCO, faces high human pressures. A highway (East-West) was constructed in the last five years within the park's area (17.5 Km long and 120 m wide) in addition to the new dams and small water reservoirs. Moreover, the urban tissue has expanded and small villages were transformed into small cities. All these factors have contributed to the negative dynamic that occurred in this landcover class.

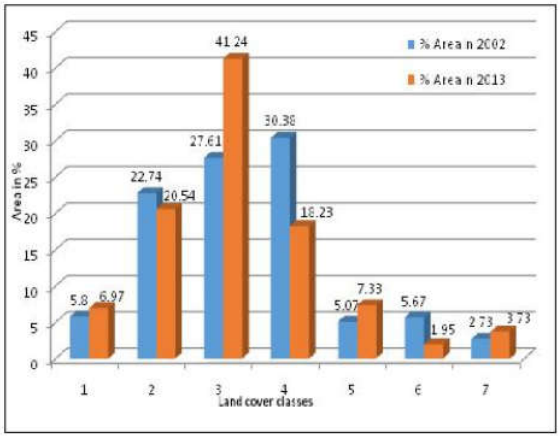

Fig. 6. Area percentage of Land cover classes for 2002 and 2013.Classes' description: (1) Water body; (2) Dense forest; (3) Open forest; (4) Uncultivated land; (5) Cultivated land; (6) Barren land; (7) Urban.

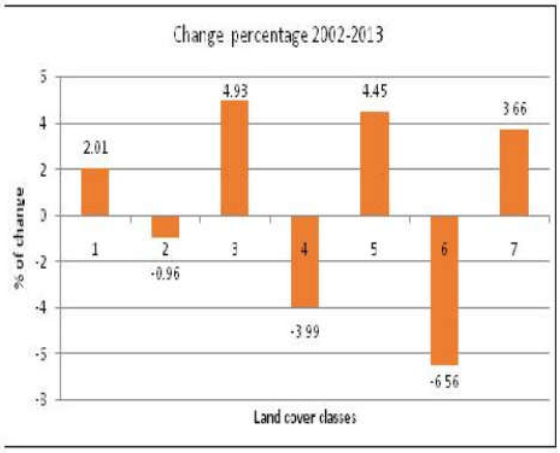

Fig. 7. Percentage of change rate between 2002 and 2013.Classes' description: (1) Water body; (2) Dense forest; (3) Open forest;(4) Uncultivated land; (5) Cultivated land; (6) Barren land; (7) Urban.

-According to the statistics provided by the Directorate of Environment and Urban Management (2014), the current population within the park is about 140000 inhabitants and has increased from 1998 (92292) and 2002 (1194242). It is worth noting that the National Park of El Kala is considered as one of the most visited places in the country, particularly its beaches, during summer periods. As an example, the number of tourists (in the beaches) was 2698365 in 2012 (Directorate of Tourism of El Tarf, 2014). Therefore, new hotels and infrastructures grew up in the park. This reflects the positive rate of change (+3.66 %) regarding the urban landcover class.

Conclusion

The National Park of El Kala is considered as one of the most diversified ecosystems in Algeria and North Africa since there are four ecosystem types (sea, lakes, dunes, forests). It hosts a very rich flora and fauna with a high level of endemic and rare species (Skinner and Smart, 1984; Stevenson, 1988; Véla and Benhouhou, 2007). However, the demographic pressure, increasing tourist flow and agricultural activities lead to major changes in vegetation and landcover.

For a better understanding of vegetation change and landcover dynamic in the National Park of El Kala, NDVI differencing and land cover change detection analysis were carried out on a Landsat ETM+2002 and Landsat 8 OLI 2013 images.

The NDVI differencing image did separate between vegetation change (decrease and increase) and no change. The threshold technique value was successful regarding the accuracies' results (overall accuracy = 98.14% and Kappa coefficient = 0.97). However, in order to identify and quantify changes at a land cover context, classical unsupervised classification was applied to both images.

Seven classes were defined: Water body; Dense forest; Open forest; Uncultivated lands (including

grasslands), Cultivated lands, Barren lands and Urban. The overall accuracy were 99.97 and 75.96, and Kappa coefficients were 0.99 and 0.61 for 2002 and 2013 respectively.

Statistics' comparison suggest that the high land cover classes affected by area's decrease are Dense forest (-0.96 %), Uncultivated land (-3.99 %) and Barren land, which is the most pronounced (-6.56 %). In contrast, land cover classes concerned by positive change are: Water body (+2.01 %); Open forest (+4.93 %) where the highest change occurred, Cultivated land (+4.45 %) and Urban (+3.66 %).

Integrating GIS and remote sensing provided valuable information on the nature and statistics of land cover changes. Field knowledge and ancillary data helped in understanding the main causes of land cover changes that occurred between years 2002 and 2013. These could be summarised by: Expansion of urban tissue and new infrastructures such as highways and dams, degradation of dense forests due to human pressures mainly grazing and clearing, intensification of agriculture activities with uncontrolled irrigation from lakes and dams and last but not least, forest fires in summers due to long droughts periods and holiday rush.

In this study, we have applied two different

Appendix I

Research Article14First Version

Summary

This study aimed to investigate the relationship between body condition score (BCS), blood biochemical metabolites, milk yield (MY) and quality (MFAT) on Montbeliard cattle (31 cows) reared in 5 farms of Algerian semi arid area. The BCS was measured in dry (6 weeks pre calving) and peak of lactation (6 weeks after calving). Blood samples was taken in some time of BC measure for determination of energy (Glucose, cholesterol, triglycerides and B-Hydroxybutyrate), nitrogen (urea and albumin) and mineral (calcium) metabolites. Milk yield was recorded in the 6^{th} week of lactation (peak). A sample of milk for each cow was used to determinate milk fat, density and acidity.

The results obtained show a significant decrease in postpartum body condition score accompanied by an increase in cholesterol and BHB concentration. The correlation analysis shows that the BHB concentration in pre calving was negatively correlated with BCS ($r = -0,321$, $p < 0.05$) and cholesterol ($r = -0,308$, $p < 0.05$). In postpartum, the BCS seems negatively correlated with cholesterol ($r = -0,416$, $p < 0.05$), urea ($r = -0,366$, $p < 0.05$) and BHB ($r = -0,487$, $p < 0.05$). However, the level of milk production decreased significantly with high glucose ($r = -0,449$, $p < 0.05$) and BHB ($r = -0,514$, $p < 0.05$). As against the fat content increased significantly with blood triglycerides ($r = 0,681$, $p < 0.05$) and BHB ($r = 0,522$, $p < 0.05$) concentration, indicating a high mobilization of body reserves used for the synthesis of milk fat. In conclusion it can be assumed that the rate of BHB seems to be the best indicator of the nutritional status of dairy cows that determines their production level and quality.

Keywords: Milk yield, Milk fat, Montbeliard cow, Body condition, Blood metabolites

Introduction

Nutrition is the first item of expenditure in dairy farming. Its management determines the level of production and milk quality. The nutritional level is traditionally enjoyed by body condition scoring that a practical and reliable tool to use for estimating energy reserves. Ayres et al. (2009) reported a strong correlation between body condition and subcutaneous adipose tissue determined by ultrasound (0.82 at dry to 0.93 in postpartum $p < 0.001$). This subjective indicator of energy balance is not only used for evaluation of herd nutritional behavior but also to evaluate its relations with production parameters (Roche et al. 2007). However, it has been documented that several biochemical indicators of metabolism may be involved in assessing the nutritional status of cows. The measurement of metabolites such as glucose, insulin, cholesterol, free fatty acids (NEFA) and ketone bodies (BHB) were often used to supplement energy balances or body condition to characterize the energy status (Reksen et al., 2002). Similarly, assays of protein, urea, ammonia, and minerals in blood were also widely used to assess nitrogen or mineral nutritional status at individual level.

Among the energy metabolites, the BHB appears more effective than as NEFA because NEFA sensitivity according to Mantysaari (1999) is early (1 week) but BHB is against late (3 to 4 weeks). The BHB is low at dry and increase linearly in postpartum particularly in cows' with low-level food while NEFA carried a peak at the first week and tend to decrease thereafter (Moallem et al. 2004). Perhaps this lag time exists because NEFA provide the substrate for BHB synthesis. Lipolysis develops at a rate that exceeded the hepatic capacity to completely oxidize or esterify the NEFA, and then BHB concentrations would rise (Cheng et al 2007). This molecule can not be metabolized; it must be excreted in urine or pulmonary path (Marie Laur., 2003). In addition, Clark et al (2005) report that the best prediction of EB

(r=0.84), if all significant indicators were used, was a linear regression model that included plasma glucose and plasma BHB.

The effect of changes in BCS and biochemical parameters on milk production level and quality is well documented. Singh et al. (2009) reported that milk yield at peak, and duration of lactation in high producing are higher among those with better body condition at dry. This disagrees with the results of Roche (2007) and Jilek et al. (2008) who reported that only the postpartum state affects production level. However, Mohammadi et al. (2011) observed a positive correlation between milk yield, BHB and glucose. This correlation is not valid according Wathes et al. (2007) during the first two weeks postpartum but milk production is significantly higher in cows expressing high levels of BHB (mobilization) and urea (good nutrition) at the fourth week. After 7^{th} week correlation remained significant only with uremia (good nutrition) for primiparous and becomes negative with BHB in multiparous. At this time, a supplementation with fatty acids corrects negative energy balance resulted in the loss of low status and decreased levels of BHB and NEFA with increased levels of glucose (McGuffey et al., 2001, Wang and al., 2009).

The present study aims to implement the relationship between body condition and metabolic markers at dry and postpartum and to clarify the impact of changes on the quantity and quality of milk produced in peak of lactation.

Materials and methods

This work was conducted from February to September 2011 on 31 Montbeliard cows reared in five farms to acceptable level of mastery. The objective was to clarify the phenotypic correlations between nutritional parameters, metabolic and milk production level at peak of lactation. The production system is similar for all farms.

Body condition is taken at dry (six weeks before calving) and at lactation peak (6th week of lactation) by the method proposed by Edmonson et al. (1989) on a scale of 1 to 5 (1 = thin and 5 = obese) and interval of 0.5.

Two blood samples are made or a 10ml sample of each cow was taken from the jugular vein. To limit the consumption of glucose from blood into red cells, plasma glucose was determined on site using a portable blood glucose meter "Accu-Chek ®". In the laboratory, blood samples were centrifuged at 4500 round / min. The serum thus recovered is spread over several samples of 500µl and stored at -20 ° C to day of analysis. After thawing in an oven at 37°C for 10min, serum were subjected to measurement by a semi automatic spectrophotometer (CYANplus ®) using commercial kits (Randox ®, UK) for biochemical parameters considered (Cholesterol CH200, Triglycerides TR210, BHB RB1007, urea UR107, albumin AB 362 and calcium CA590).

After quantification of milk production at peak, a sample of 250ml of each cow was collected after a manual homogenization was immediately transported to the laboratory in a cooler and analyzed. The determination of milk fat was made by the method of acid-butyrometric or GERBER. The density and temperature measurement are made of a thermo- lacto densitometer. The acidity of milk is usually expressed in degrees Doronic (°D) which is equivalent to a grade of 0.1 g of lactic acid per liter of milk.

The mean, standard deviation and standard error are calculated and the tests for normality (Kolmogorov-Smirnov) and homogeneity of variances (Levene’s test) were performed for all parameters. A multiple correlation (Pearson test) was used to to estimate the covariance between parameters and to determine how these were related to each other over time. The significant was fixed at $p<0.05$.

To estimate the effect of BC at dry and its change in postpartum we used one way ANOVA. The type of analysis of variance was chosen depending on nature of variables. The kreskall-Wallis test was used in cases where the normality of data is not assured. The Fisher statistics is calculated on normal data and homogeneous variances. If these are heterogeneous Fischer test is replaced by Welsh statistic. The comparison between means was performed by the LSD test (least significant difference) in the case of homogeneous variances and T2 Tahmane in the opposite case. All analyzes were performed by SPSS 18.

Results

1. Evolution of nutritional and biochemical status in pre and post calving

Changes in body condition score (BCS) and blood parameters of energy, nitrogen and mineral metabolism are summarized in Table 01. The results show that only BCS and serum cholesterol were significantly different in pre and post calving. The BCS was significantly higher in pre calving ($p < 0.01$) decreased by 10% in postpartum. However, the concentration of serum cholesterol was significantly lower in pre calving compared to postpartum ($p < 0.001$). However, although the differences are not significant ($p > 0.05$), triglycerides decreased slightly in postpartum against BHB and urea increase.

2. Production and milk quality

The average milk production at peak (sixth week of lactation) and its quality are presented in Table 02. Indeed, cows produce 20 ± 4 kg of milk to 3.17 ± 0.72% of fat. Density and acidity are equivalent to 1.030 and 16.4°D respectively.

3. Correlation analysis

Correlation analysis (Table 03) shows that in pre-calving, serum concentration of BHB in cows is negatively correlated with their body condition ($p = 0.03$, $r = -0.32$) and cholesterol concentration ($p = 0.04$, $r = -0.31$). Indeed, obese cows exhibit low concentrations of BHB and cholesterol concentrations compared to thin.

In post-calving, the level of production at peak evolves in the negative direction with blood glucose ($p = 0.02$, $r = -0.45$) and BHB ($p = 0.02$, $r = -0.51$) postpartum. Highly productive cows show low concentrations of BHB (<1.5mmol / l) or glucose (<60 mg/dl). However, the quality of milk produced (Fat) increases with the level of production at peak ($p = 0.03$, $r = 0.54$) and serum triglycerides ($p = 0.03$, $r = 0.52$). However, fat content decreased significantly with the density of milk ($p = 0.04$, $r = 0.51$).

Furthermore the BCS postpartum is strongly and negatively correlated with cholesterol ($p = 0.03$, $r = 0.52$), urea ($p = 0.03$, $r = 0.52$) and BHB ($p = 0.03$, $r = 0.52$).

The correlation between changes in pre-and post-calving nutritional and biochemical parameters, and performance is presented in Table 04. Indeed, only the change in BHB affecting production levels. This positive correlation indicates that the highest level of production is recorded in cows lose less body condition in postpartum resulted in low concentrations of BHB.

4. Analysis of variance

4.1. Effect of body condition before calving

Three classes of body condition at dry are obtained from the two step classification (table. 05). Analysis of variance showed that the level of milk production is independent to Body condition at dry ($p > 0.05$). However, fat content is high in thin and obese. For postpartum blood biochemistry, body condition at dry affects significantly serum cholesterol level with a decreasing gradient of thin to obese cows ($p = 0.04$). Serum triglycerides are moving in the

146 opposite direction but the difference was non-significant. Glucose is stable against BHB
147 increases a non-significantly with the loss body condition.
148
149 **4.2. Effect of body condition profile**
150 The two-step classification of pre and post calving body condition has allowed us to identify
151 two levels and four patterns of change in body condition (Table 6). Obese cows at dry are
152 distinguished by their level of loss in postpartum giving rise to two profiles: good without loss
153 (HWL) and good condition with significant loss (HSL). They thin are also subdivided
154 according to levels of loss in two profiles: low without loss (LWL) and low with significant
155 loss (LSL).
156 Analysis of variance showed a significant effect of body condition profiles on serum
157 triglycerides, cholesterol and BHB ($p < 0.05$). Indeed, cholesterol serum is higher in thin,
158 against triglycerides are concentrated among those with high levels of loss. The BHB is low
159 in cows HWL and increases continuously with the level of loss and peaked in cows LSL.
160 However, body condition profile appears no significant effect on the level of milk production
161 and quality. The same results were reported by Jilek et al (2008) in Czech Fleckvieh.
162
163 **Discussion**
164 The present study aims to characterize the relationship between changes in cow's body
165 condition result in blood biochemical parameters and the level of milk production and quality
166 at peak lactation. However, a sharp decrease in postpartum BCS was recorded compared to
167 dry (10% of loss). Several authors reported this decrease but with different intensities of loss
168 (Mao et al 2004; Melendez et al. 2007; Mouffok et al. 2011). Indeed, Dillon et al (2003)
169 reported that the level of reserves mobilization is related to genetic merit or highly productive
170 cows have a low body condition in postpartum. This mobilization is important in case of a

high level food at dry (Stockdale 2008) but also in postpartum (Mantysaari 1999). Good feeding cows at dry (concentrate offered five weeks before expected date of calving) are found from Ryan (2003) in good condition at calving and have the ability to mobilize more reserves in postpartum to support milk production and quality (1 kg of milk and 0.07kg of fat and 0.06kg protein per day). In contrast, Singh et al. (2009) reported that post calving body condition was negatively correlated with nitrogen supply.

The effect of diet and body condition change may occur at the biochemical level by changes in concentrations of blood metabolites. In the sample studied, blood glucose is relatively stable at around 60mg/dl. The same observation was reported by several researchers (Mantysaari 1999; Moallem et al. 2004; Casta ~ neda-Guti'errez et al., 2009; Melendez et al. 2007). This stability is ensured regardless of feeding level (Ryan 2003) and cow's body condition (Stockdale 2008). However, other researchers report that glucose concentration is higher in dry compared to postpartum (Singh et al. 2009) and increases with food (Marongiu et al. 2002). Cows in negative energy balance have low rates of glucose and high levels of NEFA and BHB (Clark et al 2005, Cheng et al 2007). Correlation analysis shows that glucose postpartum is negatively correlated with milk production. Obese cows show high concentrations of glucose tended to reduce their milk production.

In this study triglycerides are relatively higher at dry. Similar results were reported by Ling et al. (2003) and Moallem et al. (2004). Their high concentrations in postpartum promotes increased fat content in milk. However, the negative correlation with uremia level suggests that nitrogen supplementation mostly degradable form as reduced milk fat content. However, serum cholesterol was significantly higher in postpartum confirming the observations of Al-Saiady et al. (2004), Singh et al. (2009) and Mouffok et al. (2011). At dry is negatively related to BHB. Its high concentration indicates good energy nutrition. Civelek et al. (2011) reported that cholesterol decreases with increase in BHB. However, Ling et al

(2003) report a strong negative correlation in dry between cholesterol and triglycerides concentration, this situation is reversed in postpartum. Analysis of variance indicates that in postpartum cholesterol was lower in cows with average BCS without loss and increases with the level of BCS loss from dry to postpartum. This is probably explained by its contribution in triglycerides transport mobilized by adipose tissue in early lactation leading to weight loss (Ling et al. 2003).

The β-hydroxybutyrate increases in postpartum, but the difference was not significant ($p > 0.05$). These results are comfortable with those of Ryan (2003) that was observing a slight decrease of NEFA and BHB from pre to post-calving. However, the significant increase in postpartum BHB has been reported by several authors (Moallem et al. 2004; Wathes et al. 2007). The BHB is negatively correlated with food level and it therefore increases in cows fed a good diet in dry and lower quality in post partum and is low if the intake is best in pre and post calving (Mantysaari 1999, Stockdale 2008 ; Tillard et al. 2008). This indicates a strong mobilization of BCS (greater fatty acid oxidation), an inability of extrahepatic tissue to oxidise ketone bodies produced during hepatic fatty acid oxidation, or both (Roche 2007). This suggests that cows that were restricted precalving adapted to fat mobilisation better than cows that began their restriction at calving. At dry BHB is negatively correlated with body condition and serum cholesterol therefore at good nutrition confirming the results of Mantysaari (1999) which report a negative correlation ($r = -0.41$) of BHB and BCS. But dietary supplementation can reduce blood NEFA and BHB particularly in postpartum (Melendez et al. 2007). Our results also show that postpartum BHB was negatively correlated with milk yield but positively correlated to fat content. It is generally higher in thin cows that can not support their lactations but also to intense mobilization cows to increase milk fat content.

In the end it was the only parameter which changed from dry to postpartum that characterizes

milk level production. Its positive correlation indicates that cows in good BCS at dry and have the ability to mobilize stored fat in postpartum can produce more milk. The BHB also contributes to the health status of highly productive cows. Erasmus et al (2008) report that studies using BHB for assessing subclinical ketosis range from 1mol/l to 1.4mol/l for defining a subclinical threshold and 2.4mol/l for defining a clinical ketosis. Postpartum supplementation is needed to improve energy balance and reduce the impact of sub-clinical mastitis.

Uremia in postpartum is slightly higher than dry resulting the improvement of feeding in early lactation. This finding was reported by several authors and whatever the level of body condition (Ling et al 2003, Singh et al 2009). Our results also show that dry uremia is independent to the other parameters which is not consistent with other studies that report a negative (Marongiu et al. 2002) or positive correlation (Ryan 2003) of uremia with feeding level. In postpartum there was a negative correlation to body condition and serum triglycerides.

Milk yield in lactation peak estimated at 20 ± 4 kg (4280 ± 570kg per lactation 305d) is slightly above the record obtained by Madani and Mouffok (2008) during period from 1994 to 2005 on the same race. The authors report an average of 3100kg per 305d with 14kg at lactation peak. This production appears independent to body condition at dry. These results are consistent with the observations of Roche (2007) and Jilek et al. (2008) who reported that only the postpartum BC affects production level. However, Singh et al. (2009), Melendez et al. (2007) and Msangi et al (2005) note that milk yield in peak and duration of lactation in high producing are higher among those with better body condition at dry. Moreover, Moallem et al. (2004) report that pre calving supplementation increases milk production in subsequent lactation by 2 kg / d but also fat content (3 g / l). Also, Stockdale (2008) note that the production level is higher in fat cows at dry and in those receiving large amounts of

246 concentrate in postpartum. This supplementation according to Wang et al. (2009) corrects the
247 negative energy balance resulted in the low loss of BC and lower rates of BHB and NEFA
248 with increased levels of glucose. In this study a negative relationship was observed between
249 milk production and serum concentrations of glucose and BHB but negative with the change
250 of the latter. This means that cows in good condition at dry and mobilizes body reserves in
251 postpartum have the ability to produce more milk compared to those of low BC at dry or thins
252 in postpartum (Erasmus et al . 2008).
253 However, Cheng et al. (2007) observed an independence between serum glucose level and
254 milk yield. For Wathes et al. (2007) milk yield is independent to nutritional and biochemical
255 parameters during only the first two weeks post-calving but it was significantly higher in
256 cows expressing high levels of BHB (mobilization) and urea (good nutrition) at the 4th week .
257 After seven weeks the correlation remained significant only with the rate of uremia (good
258 nutrition) for primiparous and becomes negative with BHB in multiparous. However,
259 Mohammadi et al (2011) reported that milk yield increases with increase in BHB but also
260 glucose.
261 The fat content assessed to 32 ± 7 g / l seems to be positively related to serum triglycerides
262 and BHB. The fat content is derived from the mobilization of lipids as triglycerides. These
263 provide a substrate for the synthesis of BHB as the liver tissue becomes unable to use the
264 NEFA to come to accelerated mobilization (Cheng et al. 2007).

265 **Conclusion**

266 Following this research, the results obtained show a significant decrease in postpartum body
267 condition score accompanied by an increase in cholesterol and BHB concentration. The
268 correlation analysis shows that the BHB concentration in pre calving was negatively
269 correlated with BCS ($r = -0,321$, $p < 0.05$) and cholesterol ($r = -0,308$, $p < 0.05$). In postpartum,
270 the BCS seems negatively correlated with cholesterol ($r = - 0,416$, $p < 0.05$), urea ($r = - 0,366$,

271 $p < 0.05$) and BHB ($r = -0{,}487$, $p < 0.05$). However, the level of milk production decreased
272 significantly with high glucose ($r = -0{,}449$, $p < 0.05$) and BHB ($r = -0{,}514$, $p < 0.05$). As
273 against the fat content increased significantly with blood triglycerides ($r = 0{,}681$, $p < 0.05$) and
274 BHB ($r = 0{,}522$, $p < 0.05$) concentration, indicating a high mobilization of body reserves used
275 for the synthesis of milk fat. In conclusion it can be assumed that the rate of BHB seems to be
276 the best indicator of the nutritional status of dairy cows that determines their production level
277 and quality.

278

Appendix J

Research Article 14 Final Version

ABSTRACT

This study aimed to investigate the correlation between body condition score (BCS), blood biochemical metabolites, milk yield (MY) and quality (Mfat) in Montbéliarde cattle (31 cows) reared in 5 farms of Algerian semi arid area. The BCS was measured in dry and peak of lactation (6 weeks after calving). Blood samples were taken at the time of body condition (BC) measurement for determination of energy (Glucose, cholesterol, triglycerides and B-Hydroxybutyrate), nitrogen (urea and albumin) and mineral (calcium) metabolites. Milk yield was recorded in the 6th week of lactation (peak). A sample of milk for each cow was used to determinate milk fat, density and acidity. The results showed a significant decrease in postpartum BCS accompanied by an increase in cholesterol and B-Hydroxybutyrate (BHB) concentration. The correlation analysis showed that BHB concentration in pre calving was negatively correlated with BCS ($r=-0.321$; $P<0.05$) and cholesterol ($r=-0.308$; $P<0.05$). In postpartum, BCS was negatively correlated with cholesterol ($r=-0.416$; $P<0.05$), urea ($r=-0.366$; $P<0.05$) and BHB ($r=-0.487$; $P<0.05$). However, the level of milk production decreased significantly with high glucose ($r=-0.449$; $P<0.05$) and BHB ($r=-0.514$; $P<0.05$). The fat content increased significantly with blood triglycerides ($r=0.681$; $P<0.05$) and BHB ($r=0.522$; $P<0.05$) concentration, indicating a high mobilization of body reserves used for the synthesis of milk fat. In conclusion, it can be assumed that the rate of BHB seems to be the best indicator of the nutritional status of dairy cows that determines their production level and quality.

INTRODUCTION

Nutrition is the first item of expenditure in dairy farming. Its management determines the level of production and milk quality. The nutritional level is traditionally enjoyed by body condition scoring which is a practical and reliable tool for estimating energy reserves. Ayres *et al.* (2009) reported a strong correlation between body condition and subcutaneous adipose tissue (0.82 at dry to 0.93 in postpartum; $P<0.001$). This subjective indicator of energy balance is not only used for evaluation of herd nutritional status but also to evaluate its relations with production parameters (Roche, 2007). However, it has been documented that several biochemical indicators of metabolism may be involved in assessing the nutritional status of cows. The measurement of metabolites such as glucose, insulin, cholesterol, free fatty acids (NEFA) and ketone bodies (BHB) are often used to supplement energy balances or body condition to characterize the energy status.

Among the energy metabolites, BHB appears more effective than NEFA because NEFA sensitivity according to Mäntysaari *et al*. (1999) is early (1 week) but BHB is late (3 to 4 weeks). The BHB is low at dry and increases linearly in postpartum particularly in cows' with low-level food, while NEFA attain a peak at the first week and tend to decrease thereafter (Moallem *et al.,* 2004). Perhaps this lag time exists because NEFA provide the substrate for BHB synthesis. This molecule can not be metabolized; it must be excreted through urine or pulmonary path (Laur, 2003). In addition, Clark *et al.* (2005) report that the best prediction of energy balance (EB) ($r=0.84$), if all significant indicators were used, was a linear regression model that included plasma glucose and plasma BHB.

The effect of changes in BCS and serum biochemical parameters on milk production level and quality is well documented. Singh *et al.* (2009) reported that milk yield at peak, and duration of lactation in high producing cows are higher among those with better body condition at dry. This disagrees with the results of Roche (2007) and Jilek *et al.* (2008), who reported that only the postpartum state affects production level. However, Mohammadi *et al.* (2012) observed a positive correlation between milk yield, BHB and glucose.

The present study aims to investigate the relationship between body condition and metabolic markers at dry and postpartum and to clarify the impact of changes on the quantity and quality of milk produced in peak of lactation.

MATERIALS AND METHODS

This work was conducted from February to September 2011 on 31 Montbéliarde cows reared in five farms with acceptable level of feed mastery. The production system was similar for all farms. Body condition score was taken at dry (six weeks before calving) and at lactation peak (6th week of lactation) by the method proposed by Edmonson *et al.* (1989) on a scale of 1 to 5 (1=thin; 5=obese), with interval of 0.5.

Two blood samples were made and a 10ml sample of each cow was taken from the jugular vein. To limit the consumption of glucose from blood into red cells, plasma glucose was determined on site using a portable blood glucose meter "Accu-Chek ®". In the laboratory, blood samples were centrifuged at 4500 RPM. The serum thus recovered was spread over several samples of 500µl and stored at -20°C to day of analysis. After thawing in an oven at 37°C for 10 min, serum samples were subjected to measurement by a semi automatic spectrophotometer (CYANplus ®) using commercial kits (Randox ®, UK) for biochemical parameters viz. cholesterol (CH200), triglycerides (TR210), BHB (RB1007), urea (UR107), albumin (AB 362) and calcium (CA590).

After quantification of milk production at peak, a sample of 250 ml from each cow was collected. After a manual homogenization, it was immediately transported to the laboratory in a cooler and analyzed. The determination of milk fat was made by the method of acid-butyrometric or GERBER. The density and temperature measurement were made using a thermo-lacto densitometer. The acidity of milk was expressed in degrees Doronic (°D) which was equivalent to a grade of 0.1 g of lactic acid per liter of milk.

The mean, standard deviation and standard error were calculated and the tests for normality (Kolmogorov-Smirnov) and homogeneity of variances (Levene's test) were performed for all parameters. A multiple correlation (Pearson test) was used to estimate the covariance between parameters and to determine how these were related to each other over time.

To estimate the effect of BCS at dry and its change in postpartum we used one way ANOVA. The type of analysis of variance was chosen depending on nature of variables. The kreskall-Wallis test was used in cases where the normality of data was not assured. The Fisher statistics was calculated on normal data and homogeneous variances. If these were heterogeneous Fischer test was replaced by Welsh statistic. The comparison between means was performed by the LSD test (least significant difference) in the case of homogeneous, variances and T2 Tahmane in the opposite case. All analyzes were performed by SPSS 18.

RESULTS

Evaluation of nutritional and biochemical status around calving: Changes in BCS and blood parameters are summarized in Table 1. The results show that only BCS and serum cholesterol were significantly different in pre and post calving. The BCS was significantly higher in pre calving ($P<0.01$). However, serum cholesterol was significantly lower in pre calving compared to postpartum ($P<0.001$). However, although the differences were not significant ($P>0.05$), triglycerides decreased slightly in postpartum, while BHB and urea increased.

Production and milk quality: In our study, Montbéliarde cows produced at sixth week of lactation (peak) 20±4 kg of milk with 3.17±0.72% of fat. Density and acidity were equivalent to 1.030 and 16.4°D, respectively.

Table 1: Pre and post calving variability of body condition score and blood parameters

Traits	Pre calving		Post calving		P Value
	Mean±SD	SE	Mean±SD	SE	
BCS (Points)	3.04±0.41	0.07	2.77±0.49	0.09	0.009
Energetic trait					
Glucose (mg/dl)	61±9	1.4	60±9	2.0	0.588
Triglycerides (mg/dl)	43.2±27.8	4.51	39.0±23.9	4.62	0.391
Cholesterol (mg/dl)	103.8±40.5	6.49	177.1±59.9	11.13	0.000
BHB (mmol/l)	1.08±0.38	0.068	1.39±1.00	0.22	0.538
Azote trait					
Urea (mg/dl)	30.22±12.81	2.05	34.70±18.97	3.58	0.384
Albumin (g/dl)	4.22±0.49	0.09	4.25±0.47	0.10	0.801
Mineral trait					
Calcium (mg/dl)	8.52±2.58	0.41	8.30±2.33	0.43	0.646

Table 2: Correlation between BCS, Blood biochemical traits and milk yield and quality

	BCS	Glucose	Cholesterol	TG	Urea	BHB
4 week before calving						
BCS		ns	ns	ns	ns	--.321*
Glucose			ns	ns	ns	ns
Cholesterol				ns	ns	--.308*
Triglycerides					ns	ns
Urea						ns
6 week after calving						
MY	ns	--.449*	ns	ns	ns	--.514*
MFat	ns	ns	ns	.681*	ns	.522*
BCS		ns	--.416*	ns	--.366*	--.487*
Glucose			ns	ns	ns	ns
Cholesterol				ns	.461*	ns
Triglycerides					--.419*	ns
Urea						ns
BC to PC Change						
MY	ns	ns	ns	ns	ns	.652**
MFat	ns	ns	ns	ns	ns	ns
BCS		ns	ns	ns	--.372*	ns
Glucose			ns	ns	ns	ns
Cholesterol				ns	ns	ns
Triglyceride					ns	ns
Urea						ns

Milk yield (MY) and milk fat (MFat) were only included in the model after calving; BCS= body condition score; BHB=ß-Hydoxybutyrate; TG=triglycerides; *significant correlation at $P<0.05$; BC=before calving; PC=post-calving.

Correlation analysis: Correlation analysis (Table 2) shows that in pre-calving, serum BHB in cows was negatively correlated with their BCS (r=-0.32; P<0.05) and cholesterol (r=-0.31; P<0.05). Indeed, obese cows exhibit low concentrations of BHB and cholesterol compared to lean. In post-calving, production level at peak evolved in the negative direction with postpartum blood glucose (r=-0.45; P<0.05) and BHB (r=-0.51; P<0.05). High-producing cows showed low level of BHB (<1.5mmol / l) or glucose (<60 mg/dl). However, milk fat increased with the level of milk production at peak (r=0.54; P<0.05), serum triglycerides (r=0.68; P<0.05), and BHB (r=0.52; P<0.05), and decreased significantly with milk density (r=0.51; P<0.05). Furthermore, postpartum BCS was strongly and negatively correlated with cholesterol (r=-0.42; P<0.05), urea (r=-0.37; P<0.05) and BHB (r=-0.49; P<0.05).

Effect of body condition around calving: Analysis of variance (Table 3) showed that the level of milk production was independent of BC at dry (P>0.05). However, fat content was high in thin and obese. For postpartum blood biochemistry, BC at dry affected significantly serum cholesterol level with a decreasing gradient from thin to obese cows (P<0.05). Serum triglycerides showed the opposite trend but the difference was non-significant. However, a significant effect of BC profiles on serum triglycerides, cholesterol and BHB (P<0.05) was noted (Table 4).

DISCUSSION

The present study aims to characterize the relationship between changes in cow's BC, blood biochemical parameters and the level of milk production and quality (milk fat) at peak of lactation. A sharp decrease in postpartum BCS was recorded compared to that at dry (10% of loss). Several authors reported this decrease but with different intensities (Singh *et al.,* 2009; Mouffok *et al.,* 2011). Indeed, Dillon *et al.* (2003) reported that the level of reserves mobilization was related to genetic merit and highly productive cows had a low BC in postpartum.

The effects of diet and BC change may occur at the biochemical level by changes in concentrations of blood metabolites. In the present study, blood glucose was relatively stable at around 60mg/dl according to observation of Melendez *et al.* (2007) in cattle and Pulina *et al.* (2012) in sheep. Kaewlamun *et al.* (2012) noted that glucose concentrations remained stable and increased slightly at calving reflecting an increase in gluconeogenesis in response to calving stress. However, other researchers reported that glucose concentrations were higher in dry cows (Singh *et al.,* 2009) and increased with food (Marongiu *et al.,* 2002). Cows in negative energy balance have low rates of glucose and high levels of BHB (Xia *et al.,* 2007).

In this study triglycerides were relatively higher at dry stage. Similar results were reported by Ling *et al.* (2003). Their high concentrations in postpartum promotes increased fat content in milk. However, the negative correlation of triglycerides with uremia level suggests that nitrogen supplementation especially in degradable form can reduce milk fat content. However, cholesterol was significantly higher in postpartum. At dry it was negatively related to BHB. Its high concentration indicates good energy nutrition (Civelek *et al.,* 2011). However, Ling *et al.* (2003) reported a strong negative correlation in dry cows between cholesterol and triglycerides concentration, this situation was reversed in postpartum. Analysis of variance indicated that in post-calving, cholesterol was lower in cows with average BCS without loss and increased with the level of BCS loss from dry to postpartum. This can probably be explained by its contribution in triglycerides transport mobilized by adipose tissue in early lactation (Ling *et al.,* 2003).

The β-hydroxybutyrate increased in postpartum, but the difference was non significant (P>0.05). The BHB is negatively correlated with food level and it therefore increases in cows fed a good diet in dry and lower quality in post partum (Stockdale, 2008). At dry BHB is negatively correlated with body condition and serum cholesterol (Mäntysaari *et al*., 1999). But dietary supplementation can reduce blood NEFA and BHB particularly in post-calving (Melendez *et al.,* 2007).

In the end it was the only parameter which changed from dry to postpartum that characterizes milk level production. Its positive correlation indicates that cows in good BCS at dry have the ability to mobilize stored fat in postpartum and can produce more milk.

Milk yield in lactation peak, estimated at 20±4 kg, appears independent to body condition at dry. These results are consistent with the observations of Jilek *et al.* (2008) and Roche (2007), who reported that only the postpartum BC affected milk production level. Mushtaq *et al.* (2012) report that milk yield was negatively correlated with post-partum BCS probably due to mobilization of body reserves especially in early lactation. In addition, Loker *et al.* (2012) noted that changes in BCS and milk yield were related physiologically, these changes may not occur in perfect synchrony. For them, as lactation progressed, lower production was associated with greater BCS. However, Singh *et al.* (2009) and Msangi *et al.* (2005) noted that milk yield in peak and duration of lactation in high producing were higher among those with better body condition at dry. Moreover, Moallem *et al.* (2004) reported that pre calving supplementation increased milk production in subsequent lactation by 2kg/d but also fat content (3g/l). However, post-partum supplementation can correct the negative energy balance, resulting in the low loss of BC and lower rates of BHB and NEFA (Wang *et al.,* 2009).

According to Wathes *et al.* (2007), milk yield was independent to nutritional and biochemical parameters during only the first two weeks post-calving but it was significantly higher in cows expressing high levels of BHB (mobilization) and urea (good nutrition) at the 4th week.

The fat content assessed as 32±7g/l seems to be positively related to serum triglycerides and BHB. The fat content is derived from the mobilization of lipids as triglycerides. These provide a substrate for the synthesis of BHB in the liver tissue from NEFA not completely oxidize, consequence of limit hepatic capacity to use all fatty acid result from accelerate mobilization (Xia *et al.,* 2007).

The results obtained in this research show a significant decrease in postpartum body condition score

Table 3: Milk yield and quality and post-calving blood traits according to pre calving BCS

BCS at calving	BC	Milk yield and quality			Post-partum blood biochemistry			
		MY (kg)	Fat (g/l)	D	BHB (mmol/l)	Triglycerides (mg/dl)	Cholesterol (mg/dl)	Glucose (mg/dl)
Low	2.64±0.04a	22.8±1.3	36.7±2.9a	1.028	1.73±0.38	33.5±13.2	219±27a	56.7±2.7
Medium	3.01±0.01b	19.3±1.0	26.2±2.1b	1.031	1.35±0.33	37.4±5.1	175±13ab	62.9±2.1
High	3.75±0.14c	20.8±0.3	31.0±2.3ab	1.030	0.77±0.19	47.9±12.2	135±13b	59.3±5.5

MY=Milk yield; Values bearing different letters in a column differ significantly (P<0.05).

Table 4: Milk yield and quality and post-calving blood traits according to BCS profile

Profiles	BCS BC	BCS AC	MY (kg)	MFat (g/l)	Post-partum blood biochemistry				
					Glucose (mg/dl)	BHB*(mmol/dl)	Triglycerides*(mg/dl)	Cholesterol*(mg/dl)	Urea (mg/dl)
HWL	3.8±0.6	3.7±0.3	20.1±1.3	35.0±1.0	64.4±14.0	0.48±0.2	54.4±12.6	106±7.6	20.8±16
HSL	3.6±0.1	2.8±0.3	20.8±1.0	29.0±2.8	52.8±6.3	0.92±0.4	40.5±42.9	164±11.6	33.5±19
LWL	3.0±0.1	2.9±0.1	20.9±2.5	25.0±6.6	60.6±6.1	1.08±0.1	28.2±11.0	194±44.8	33.0±17
LSL	2.8±0.2	2.4±0.3	20.3±5.1	32.3±12	60.9±9.5	1.95±0.1	42.8±27.3	192±72.7	41.3±22

HWL=High without loss; HSL=High with significant loss; LWL=Low without loss; LSL=Low with significant loss; BC=Before calving; AC=After calving; MY=Milk yield; MFat=Milk fat ; *Significant difference at P<0.05.

accompanied by an increase in cholesterol and BHB concentration. In pre-calving, BHB was negatively correlated with BCS and cholesterol. In postpartum, BCS seems negatively correlated with cholesterol, urea and BHB. However, the level of milk decreased significantly with high glucose and BHB. The fat content increased significantly with blood triglycerides and BHB concentration, indicating a high mobilization of body reserves used for the synthesis of milk fat.

Conclusion: On the basis of results of this study, it can be interpreted that BHB seems to be the best indicator of the nutritional status of dairy cows that determines their production level and quality.

REFERENCES

Ayres H, RM Ferreira, JR de Souza Torres-Júnior, CGB Demétrio, CG De Lima and PS Baruselli, 2009. Validation of body condition score as a predictor of subcutaneous fat in Nelore (*Bos indicus*) cows. Livest Sci, 123: 175-179.

Civelek T, I Aydin, CC Cingi, O Yilmaz and M Kabu, 2011. Evaluation of serum nonesterified fatty acids and beta-hydroxybutyrate in dairy cows with retained placenta. Pak Vet J, 31: 341-344.

Clark CEF, TWJ Fulkerson, KS Nandra, I Barchi and KL Macmillan, 2005. The use of indicators to assess the degree of mobilisation of body reserves in dairy cows in early lactation on a pasture-based diet. Livest Prod Sci, 94: 199-211.

Dillon P, F Buckley, P O'Connor, D Hegarty and M Rath, 2003. A comparison of different dairy cow breeds on a seasonal grass-based system of milk production. Milk production, live weight, body condition score and DM Intake. Livest Prod Sci, 83: 21-33.

Edmonson AJ, IJ Lean, LD Weaver, T Farver and G Webster, 1989. A body condition scoring chart for Holstein dairy cows. J Dairy Sci, 72: 68-78.

Jilek F, P Pytloun, M Kubešova, M Štipkova, J Bouška, J Volek, J Frelich and R Rajmon, 2008. Relationships among body condition score, milk yield and reproduction in Czech Fleckvieh cows. Czech J Anim Sci, 53: 357-367.

Kaewlamun W, M Okouyi, P Humblot, D Remy, M Techakumphu, C Duvaux-Ponter and AA Ponter, 2012. Effects of a dietary supplement of carotene given during the dry period on milk production and circulating hormones and metabolites in dairy cows. Revue Méd Vét, 163: 235-241.

Ling K, H Jaakson, J Samarütel and A Leesmäe, 2003. Metabolic status and body condition score of Estonian Holstein cows and their relation to some fertility parameters. Vet Zootec, 24: 94-100.

Loker S, C Bastin, F Miglior, A Sewalem, LR Schaeffer, J Jamrozik, A Ali and V Osborne, 2012. Genetic and environmental relationships between body condition score and milk production traits in Canadian Holsteins. J Dairy Sci, 95: 410-419.

Mäntysaari P, KL Ingvartsen and V Toivonen, 1999. Feeding intensity of pregnant heifers: Effect of feeding intensity during gestation on performance and plasma parameters of primiparous Ayrshire cows. Livest Prod Sci, 62: 29-41.

Laur MC, 2003. Cétose et toxémie de gestation : étude comparée; Thèse de docteur vétérinaire [Ketosis and regnancy toxemia: Comparative study; Vet Doctor State Diploma thesis]. Université Paul-Sabatier, Toulouse, France; pp: 112.

Marongiu ML, G Molle, L San Juan, G Bomboi, C Ligios, A Sanna, S Casu and MG Diskin, 2002. Effects of feeding level before and after calving, and restricted suckling frequency on postpartum reproductive and productive performance of Sarda and Charolais X Sarda beef cows. Livest Prod Sci, 77: 339-348.

Melendez P, JP Goff, CA Risco, LF Archbald, R Littell and GA Donovan, 2007. Pre-partum monensin supplementation improves body reserves at calving and milk yield in Holstein cows dried-off with low body condition score. Res Vet Sci, 82: 349-357.

Moallem U, I Bruckental and D Sklan, 2004. Effect of feeding pregnant and non-lactating dairy cows a supplement containing a high proportion of non-structural carbohydrates on post-partum production and peripartum blood metabolites. Anim Feed Sci Tech, 116: 185-195.

Mohammadi MC, AR Ghasrodashti, A Tamadon and MA Behzadi, 2012. Effects of prepartum monensin feeding on energy metabolism and reproductive performance of postpartum high-producing Holstein dairy cows. Pak Vet J, 32: 45-49.

Mouffok C, T Madani, L Semara, M Baitiche, L Allouche and F Belkasmi, 2011. Relationship between body condition score, body weight, some nutritional metabolites changes in blood and reproduction in Algerian Montbéliarde cows. Vet World, 4: 461-466.

Msangi BSJ, MJ Bryant and PJ Thorne, 2005. Some factors affecting variation in milk yield in crossbred dairy cows on smallholders farms in north-east. Trop Anim Health Prod, 37: 403-412.

Mushtaq A, MS Qureshi, S Khan, G Habib, ZA Swati and SU Rahman, 2012. Body condition score as a marker of milk yield and composition in dairy animals. J Anim Plant Sci, 22 (Suppl 3): 169-173.

Pulina G, A Nudda, G Battacone, C Dimauro, A Mazzette, G Bomboi and B Floris, 2012. Effects of short-term feed restriction on milk yield and composition, and hormone and metabolite profiles in mid-lactation Sarda dairy sheep with different body condition score. Italian J Anim Sci, 11: e28.

Roche JR, 2007. Milk production responses to pre- and postcalving dry matter intake in grazing dairy cows. Livest Sci, 110: 12-24.

Singh RR, T Dutt, AB Mandal, HC Joshi, HN Pandey and M Singh, 2009. Effect of body condition score on blood metabolite and production performance in crossbred dairy cattle. Indian J Anim Sci, 79: 629-635.

Stockdale CR, 2008. Effects of body condition score at calving and feeding various types of concentrate supplements to grazing dairy cows on early lactation performance. Livest Sci, 116: 191-202.

Wang C, Q Liu, WZ Yang, Q Dong, XM Yang, DC He, KH Dong and YX Huang, 2009. Effects of malic acid on feed intake, milk yield, milk components and metabolites in early lactation Holstein dairy cows. Livest Sci, 124: 182-188.

Wathes DC, Z Cheng, N Bourne, VJ Taylor, MP Coffey and S Brotherstone, 2007. Differences between primiparous and multiparous dairy cows in the inter-relationships between metabolic traits, milk yield and body condition score in the periparturient period. Domest Anim Endocrinol, 33: 203-225.

Xia C, Z Wang, YF Li, SL Niu, C Xu, C Zhang and HY Zhang, 2007. Effect of hypoglycemia on performances, metabolites, and hormones in periparturient dairy cows. Agri Sci China, 6: 505-512.

Appendix K

Research Article One First Version

Abstract

Hilly terrain and intensive rainstorm make slope instability a common phenomenon in Babors chain. This paper reports on the use of a GIS-based frequency ratio (FR), and logistic regression (LR) models, to assess landslide susceptibility on Bouandas municipality (Northeastern of Algeria). An inventory map showing the location of 295 landslides that have occurred during the last ten years was constructed using data from various sources. The study database was compiled from DEM, satellite images, aerial photographs and géologic maps, etc. to describe the physical parameters of the terrain and the statistical relations of landslide frequency with the pre-conditionning factors contributing to the occurence of the phenomenon. This database is then used to obtain susceptibility index values using the applied models. The obtained results show that a strong hazard threats a large parts of the study area. That slope gradient, lithology, and precipitations are statistically significant in predicting slope instability, while aspect and elevation are less important. The landslide susceptibility maps were validated and compared using the validation dataset that was not used in the model building. The model derived using LR has a highest prediction capability (86%) than the FR (84%). The two models yield reasonable results that may be used for general landuse planning purposes.

Key words: Statistical approach; Landslide assessment; frequency ratio (FR); logistic regression (LR).

1. Introduction

Landslide is among the recurrent natural hazard problems that arise widespread and that have caused large losses of life and property in the Eastern areas of the Tellian chain (Gadri et al. 2015; Bourenane 2016; Zahri et al. 2016, Achour et al. 2017; Mouici et al. 2017; Hadji et al. 2017). In Babors mountains, and in particular, in the Bouandas region, many large landslides occurred during and after the heavy rainfalls. Those landslides mainly occurred on cut slopes in steep natural hillsides including roads and residential settlement areas. This region is directly affected by Neogene tectonic influence, resulted in the imbrication of allochthonous napes and the extrusion of triassic material along faults and thrust sheet fronts (Hadji et al. 2014a). Combined with acute rainstorms and active seismicity, these conditions explain the triggering of several types of slope failures.

Landslide susceptibility mapping may be defined as qualitative or quantitative, (Guzzetti et al., 1999). It could be practical for land planning in complex-geomorphologic areas. The aim of this work is to investigate the potential of FR and LR statistical models to produce two landslide susceptibility maps in Bouandas common, with what, land managers can have a preliminarily decision on where to make development projects especialyy near potential dangerous slopes.

Bouandas common (North of Setif province) is a hilly area situated in Babors mountains chain in the northestern of Algeria. It covers an area of about 38.4 km^2 between longitudes 05°03′01″E and 05°09′40″E, and latitudes 36°28′26″N and 36°32′06″N (Fig. 1b). The altitude varies from 707 to 1605 m, and it decreases from the northwest to the southeast (Fig. 1c, d). Approximately 44% of the study area has ground slopes greater than 15°. A road network of 78.5 km of different types deserves the common.

The climate is subhumid (Hadji et al; 2014b). According to statistics of the last five decades, the peak precipitations is recorded in december and january with 129 and 130 mm/month respectively. The snow pack covers high altitudes for two to three months. The melting of this

snow increases the effects of rain in the triggering of landslides in spring. Summer rainstorms can be intense, yielding sometimes more than 50 mm/day. Most of the study surface area was drained by Msalta wadi and its tributaries that supply Ighil-Emda Dam.

Several formations of the flysch and Tell thrust sheets outcrop in the region, (Fig. 2) (Bouillin 1986). The study area consists on thirteen lithological formations, spread over four structural units (Fig. 3). The Quaternary formations are not well developed. The Neogene, Paleogene, Cretaceous and Jurassic formations are essentially marl or pelitic entities with Eocene and Senonian limestones. And the Triassic is gypsum-clayey showing the same exotic appearance. Tectonically the substratum reflects a complexity and a variety of fault lineaments with a mean direction of 148° toward Southeast.

2. Methodology

Seventeen landslide-related factors were extracted for the landslide susceptibility analysis. They were established into categorical format and stored in a spatial data base with 25*25m grid size. The overall dataset consisted of 61,382 cells with 408 rows and 281 columns. The applied method begins with lndslide inventory and conditioning factors preparation then FR and LR models processing, and finally the validation procedure.

2.1. Landslides inventory

The landslides inventory of the study area was compiled from aerial photographs, satellite images, and extensive field surveys. In total, 295 single or multiple events that have occurred during the last ten years were recorded and mapped. The areal extent of the landslides reach 3.4 km^2, their directional distribution has a trend toward East, with 94.4°. Their area percentage reach 9 % and their density is 7.7 event/km^2. The identified landslides are mostly shallow-seated, and generally exhibit progressive character. They are mainly classified as rotational (138 events), planar (93), compound landslide (15), toppling failures

(31) and mudslide (18). In all, 83% of the mapped landslides are rotational, planar, or compound (Fig. 4). The Landslides inventory map was randomly divided into a training dataset with 75% (221 event) for building the models and a validating dataset with 25% (74 event) for the validation purpose.

2.2. Conditioning factors database

The identification of the conditioning factors is the basis of the most of landslides susceptibility assessment based-GIS methods. They were: slope gradient, aspect, curvature, elevation, flow direction (FlDr), topographic wetness index (TWI), stream power index (SPI), and the water course network (derived from the DEM), lithology and lineaments (derived from the geological database), road network (derived from satellite images). The precipitations amount (inferred from the rainfall database) and the seismicity (figured out from the historical dataset).

Four DEM-derived morphological features were considered for the analysis (slope angle, slope aspect, curvature and elevation).

Slope gradient is viewed as the major conditioning factor in landslides occurrence (Hadji et al. 2013). According to the configuration of slope conditions in MW occurrence, the study area was divided to five categories: (<5°), (5-10°), (10-15°), (15-20°), and (>20°), (Fig. 5a).

A lot of studies considered slope aspect as a meteorological-related factor in MW occurrence (Pradhan and Lee 2010). This agent brands the differential effect of the wetting-drying in slopes. Four cardinal directions (N, E, S, W), four intermediate (NE, SE, SW, NW) and flat lands were obtained (Fig. 5b).

The plan-curvature characterizes the morphology of the topography. In this map, zero values represents flat lands, negative values signifies concave slopes, and positive values denotes convex ones, (Fig. 5c).

The elevation of the study area was classified into five classes using natural breaks method: (707 - 907m), (907 - 1044m), (1044 - 1192m), (1192 - 1360m), and (1360 -1605m), (Fig. 5d).

Three geological parameters were considered for the analysis (lithofacies, faults density and distance from faults).

The lithofacies map of the area was prepared by digitalization from two geologic maps and a field work. According to their specificities, the outcrops were classified to 13 lithological units (Fig. 3), (Table 1).

Lineaments are considered as an important co-seismic factor. It can act as weakening agent both at the surface and at depth. The mapped faults come from a bibliographic synthesis (Guiraud et al. 2005), the analysis of the morphostructural and hydrographic anomalies, and from remote sensing by the application of directional filters to different spectral bands. The produced lineament map was the basis of the calculation of fault proximity and density. Based on field work, the study area was divided to five categories of fault proximity: (<250), (250-500 m), (500 - 750 m), (750 - 1000 m) and (>1000) m (Fig. 5e). The fault density integrates the cumulative length of faults per surface unit, as it incorporates the existence of tectonic nodes represented by fault's intersection. The produced map comprises five classes of fault lineament density: (VL), (L), (M), (H) and (VH), (Fig. 5f).

Five hydrological parameters were considered for the analysis (FlDr, TWI, SPI distance to water course and streams density).

The FlDr map displays the direction of water course from each cell to its steepest downslope neighbor. This Raster was classified to the eight main directions, (Fig. 5g).

TWI involves the upstream contributing area, a slope raster, and a couple of geometric functions, (Eq. 1). Higher values represent drainage depressions and lower ones represent crests and ridges. Five categories were created for the analysis, (Fig. 5h).

The SPI characterizes the stream power, which is the time rate of energy expenditure, and thus a measure of the erosive power of overland flow (Eq. 2). Five categories were created for the analysis (Fig. 5i).

$$TWI = ln(a/tan\ \beta) \quad (1). \qquad SPI=\alpha.tan\beta \quad (2)$$

(α is the local upslope area draining through a certain point per unit of contour length, β is the local slope gradient in degrees).

The water course network is a basic parameters that control the occurrence of landslides. The water flow can have a destabilizing effect on slope stability by saturating or/and by eroding the base of slopes. Depending on the field study, the produced map contains five class with 50 m intervals: (< 50 m), (50 - 100 m), (100 - 150 m), (150 - 200 m), and (>200 m), (Fig. 5j). Streams density calculates the magnitude per unit area from drainage network using a kernel function, to fit a smoothly tapered surface to each water course. The produced map comprises five classes of drainage network density: (VL), (L), (M), (H) and (VH), (Fig. 5k).

Five environmental and anthropogenic parameters were considered for the analysis (annual precipitation, high intensity rainfall, distance to roads, roads network density and seismicity).

Precipitation causes the fluctuation of the soil moisture, increases the interstitial pore water pressure, and decreases the material cohesion (Hamed et al. 2014). It has led to the formation of severe sequences of soil erosion and wasting during and/or after rainy seasons in the study area. The inter-annual average precipitation map, was interpolated using the annual average rainfall at nine meteorological stations surrounding the study area. A rainfall distribution map was prepared and reclassified to four classes (771 - 870 mm), (870 - 925 mm), (925 - 963 mm), and (963 - 1000 mm) (Fig. 5l). The High intensity rainfall map was prepared using maximum daily precipitation of each year. The values for a return period of 50 year ranges from 96 mm to 147 mm. Consequently aprecipitation isohyet map was prepared and

reclassified into five classes (96 - 120 mm), (120 - 130 mm), (130 - 136 mm), (136 - 142 mm), (142 - 147 mm), (Fig. 5m).

For defining the effect of the road network on slope stability, the study area was divided to five categories: (< 50 m), (50 - 100 m), (100 - 150 m), (150 - 200 m), and (> 200m), (Fig. 5n). The road network density map comprises five classes: (VL), (L), (M), (H) and (VH) (Fig. 5o).

Seismic activity can initiate new landslides or reactivate the stabilized ones (Hadji et al. 2016). It can immediately cause earthslides, mudslides or rockslides, etc. Or, it may have longer-term effects, increasing the rock fracturing, and reducing the slope strength. Historical recording confirms that a big number of earthquakes have epicenters near major tectonic discordances. A seismic map was created for the study area by amulti-steps interpolation. It contains three classes with magnitudes ranging from 3.13 to 3.58 (Fig. 5p).

2.3. Processing

The FR and LR modeling are carried out within a GIS platform using ArcGIS 10.5 software. The statistical analysis uses an external statistical package (XLStat-Pro). Whereas remote sensing has been widely used for visual registration of landslides.

In both FR and LR models, training and validation phases were followed, hence 3/4 of all the inventoried landslides are used for the training models and the remaining quarter for the validation.

Landslide susceptibility index (LSI) maps from FR and LR models were generated for the entire study area using training dataset, to prepare the prediction rate-curve that shows how well the model and parameters fit the LS maps. They were ranked to five hierarchic categories for both models.

Frequency Ratio Model

The FR model is a mathematical relationship between landslide occurrence and its conditioning factors. The ratio calculates the landslide occurrence probability to the non-

occurrence probability for a given attribute, with Eq. (3). Once the ratio of each MW factor class was found, the MWSI were summed by adding the FR raster maps of all the MW factors as shown in Eq. (4), (Yilmaz, 2010):

$$FR=\frac{\frac{D_i}{\sum_{i=1}^{n} D_i}}{\frac{A_i}{\sum_{i=1}^{n} A_i}} \quad (3) \qquad LSI=\sum_{j=1}^{j=n} FR \quad (4)$$

(D_i is the area of landslide of the i^{th} category, A_i is the area of the i^{th} category for the parameter and n is the category number of the parameter).

Therefore the resulted model shows the degree of correlation between landslides and conditioning factor classes. The greater ratio value (FR>1) indicates a higher relationship between MW occurrence and the given factor's classes, while a lower ratio value (FR<1) indicates a less probability of MW occurrence, (Ozdemir and Altural, 2013).

Logistic regression Model

LR is a probabilistic analysis, suitable for predicting the presence/absence of landslides based on the conditioning dataset variables. This non linear relationship between MW occurrence and its dependency on several variables is expressed as Eq. (5) and the linear combination as Eq. (6), (Lee and Sambath 2006):

$$Pr = 1/(1 + e^{-z}) \quad (5) \qquad Z = b_0+\sum_{i=1}^{i=n} b_i x_i \quad (6)$$

(Pr is the estimated probability of an landslide event occurring, Z is the linear combination, b_0 is the intercept of the model, b_i is the coefficient of the LR model, X_i is the independent variable and n is the number of independent variables used for the modeling).

The database containing landslide presence-absence pixels of all conditioning factors was converted into an ASCII format, and used in the statistical package for LR generation.

2.4. Validation and comparison

In LS assessment; the validation of the resulted maps is an indispensable stage, in which without it, the prediction models have no scientific impact (Pradhan 2013). The method of validation employed the ROC curve. If there are two dependent variables, the curve can be drawn using the predicted dependent variables through statistical models. The AUC characterizes the quality of a forecast system by describing its ability and explain how well the model and factors fit the susceptibility maps.

3. Results and discussion

FR : Regarding to geomorphological parameters, the analysis of FR demonstrate that areas with slope gradien ≥20° have a very high probabilities to MW occurrence with (FR=1.60). Slope aspect bounded for (N, NE and E) have coherent connection with MW occurrence (FR=1.24); this is certainly due to the condensation of rain from East through Kherrata pass. The relationship between curvature and MW indicate that they generally occur in or near concave slopes (FR=1.18). FR is high in middle-altitudes area where elevation ranges between 1044 and 1360m (FR=1.19); when in higher and lower altitude, the probabilitiy of MW decrease. This is certainly due to the existence of resistant rocky outcrops in mountain peaks versus to gentle slopes on valley. In other terms a concave hill with inclination higher than 20°, directed to East and culminating betwem 1050-1350m exhibit a high probability of MW. Whereas areas with convex gentle slope, and low altitudes are less prone to wasting.

regarding to the geological parameters, FR shows its maximum value in Triassic extrusion; their crushed character makes them very favorable to the development of instabilities (*t*; FR=3.12). Whereas yellow marls and Quaternary outcrops reveals a high correlation with MW occurence (C^{5}_{DA}; FR=1.55); (*Q*; FR=1.06). The FR values of (C_{BA}, $n^{1\text{-}6}$, $n^{1\text{-}3}$, C^{6}, C^{6c} and *li*) formations indicates a low correlation. However ($e^{1\text{-}4}$, $i^{3\text{-}5}$, $i^{1\text{-}2}$ and C^{1}_{DA}) units indicates a none correlation; because any MW point was recorded in these formations (the lithological

description of the symbols is provided in table 1). The ratio between MW and fault proximity is ≥ 1 for distances values ≤ 500 m. The same can be said about faults density whose (M, H and VH) densities exhibit a strong correlation. These weakness zones are caused by fault's intersection nodes.

concerning the hydrological parameters; the flow direction with NE, E, SE, and S orientation have stronger relationships than other, and exhibit high probabilities of MW occurence. It coincides with the same preferential directions of slope aspect parameter. FR values are higher where TWI and SPI are larger, this indicates a good correlation between these hydrological parameters and MW occurence. The distance from rivers less than 100 m has a stronger relationship with WM, and areas with (H and VH) streams densitiy have high probabilities of wasting; they are more prone to failure. The relationship between precipitations (annual and daily rainfall) and MW occurrence indicate that MW correlates very well with high values of rain (FR=1.40). This confirm that precipitation especially rainstorm is the major trigger factor of landslides in the study area. The relationship between roads proximity and landslides indicate that they generally occurred near roadsat distances smaller than100 m. Areas with (M, H, VH) roads density exibit a significative ratios. Finaly, FR increases in areas with higher magnitude values (FR=1.13). It seems a greater likelihood of seismic triggering of landslides during the wet season. All the FR values of the conditioning factors are reported in Table 2.

To calculate LSI, all factor's FR values were summed as expressed above in (eq. 4). values vary from 12.2 to 21.7. The resulted map is represented in figure 6a. Considering data distribution histogram, the natural break method classifier was applied for ranking the study area to five hierarchic susceptibility classes: VL (11.59%), L (20.79%), M (32.54%), H (26.96%) and VH (8.12%), (Fig. 6b).

LR: The 17 selected conditioning factors with 95 classes, constituting the coded independent variables dataset were converted into ASCII format. Then, the statistical package (XLSTAT-Pro) was used to estimate the correlation between landslide events and their conditioning factors. The logit of (z) function is calculated for all cells of the study area. The final members of the classification scheme are fixed as nil for a no susceptibility, and one as for a total susceptibility. Based on constant values, the MW occurrence predicting equation was obtained as follows:

z=4.017+(0.376*Slope) +(-0.017 *Aspect) +(0.125 *Curvature) +(-0.013 *Elevation) +(0.427* Lithology) +(0.197* disnce from faults) +(0.184*faults density) + (0.075*FlDr) + (0.084 *TWI) + (0.018*SPI) +(0.175* distance from rivers) + (0.102*streams density) + (0.210 *Annual rains) +(0.226*daily rains) +(0.102*Road proximity) +(0.09*Roads density) + (0.189 *Seism).

The resulted regression coefficient values (RC) shows the relative importance of each causal factor involved in landslides occurrence. The coefficient related to lithology showed a very strong dependence (RC=0.427). Slope inclination corresponded to high positive RC which confirm a higher dependence between its increasing and MW (RC=0.376). the same state is noted for precipitations (RC=0.226); they represent the most effective parameters in terms of MW occurrence. The slope aspect and elevation were registered with negative RC with values of (-0.017 and -0.013), that proved these factors as less significant to promote MW activities. The remaining factors such as fracturing, curvature, distance from rivers, Road and seism, etc., were proved to be moderately important in the present context. In order to predict the possibility of wasting in each grid, probability was calculated from the eq (5). A MWSI map was obtained by converting the file into the raster format (Fig. 7a). The natural break classifier was applied for ranking the study area to five susceptibility classes (Fig. 7b) : VL(12.03%), L(16.30%), M(26.26%), H(29.49%), and VH(15.92%).

The comparison between ten tests with different combinations has selected the model with the highest ($AUC_{LR=}$ 0.84) for editing the MWS map of study area. The FR model gives AUC_{FR} =0.86 (Fig. 8). Our findings showed that the existing high and very high susceptibility classes cover nearly, 47% (36.5 Km) of roads and 10% (13.4 ha) of settlements.

4. Conclusion, Recommendations and Outlook perspectives

Landslides are frequently controlled by geologic, morphometric, anthropogenic hydroclimatic and environmental factors. In this study, GIS-based techniques, FR, and LR, models were used for LS assessment in Bouandas common. Seventeen conditioning variables were considered, i.e., slope degree, slope aspect, altitude, plan curvature, lithology, distance from faults, faults density, FlDr, TWI, SPI, distance from rivers, stream density, annual and daily precipitation, distance from roads, roads density and seism, for which maps were derived using Arcgis 10.5 tools.

Based on the findings obtained in this study, it was found more than a third of the study area was prone to landsliding due to the existence of highly weathered lithologic units and the adverse effects of topography and improper land use. The hazardous areas concentrates in the North and Northeast of the study area, near Jebel Draa El Houch, Jebel Tizien Nobr and Jebel Beni Tizi. The transportation network is in half subjected to strong susceptibility, whereas more than a tenth of building are built on land classified as highly susceptible to MW. Two maps with five LS susceptibility classes each, were derived with natural break method. The validation has been determined by using the ROC method and testing data, in which the accuracy of the MWS maps produced by the FR and LR models was 0.86 and 0.84, respectively. The AUC plots showed that the LS map produced by the FR model has the highest prediction accuracy.

The produced maps can provide an efficient preliminary assessment of Landslides occurrence in the study area. Urban planners, decision makers and owners can then make decisions and

prepare prescriptions. Landslide mitigation arequire complex interdisciplinary studies involving geomorphologists, geologists, civil engineers, etc. The concurrence of a Triassic material with steep slope and drainage network requires more meticulousness in the planning of roads and facilities.

Finally it is necessary to promote an understanding of the nature of landslide danger in order to enable the public to develop a realistic expectation for slope safety.

Appendix L
Review report 7A

Dear authors,

I have read your paper. You aim to make a qualitative risk assessment for landslides for Souk Ahras region NE Algeria. I read your paper as a case study, which may be interesting for the people in the study area, and postgraduate readers, as the paper uses informative/didactic methods.

I consider this paper suitable for publication, after Minor corrections and improvment

-First of all, English. I'm not a native speaker, by I can clearly see that the level of English grammar and syntax is medium. The authors need to revise the paper with an English native speaker, possible with a scientific background.

-Title: there is a spelling mistake in the title: Please correct the title or change it;

-Precipitation records, could have been used to analyze the relation with landslide occurrence dates, and to establish frequency classes of landslides.

-The analysis of the historical landslides should be carried out with much more detail.

-Please provide more information on their temporal distribution, their types and damage , and their causes (if available). Are there no historical records of landslides with road , water, sewage departments?

-Please detail more between rotational, planar and coumpond landslides

-Why you use 70% of the total events for the model construction and 30% for its validation.

-Using a value of 1 for buildings means that buiildings exposed to landslides will be considered as completely destroyed.

-What is corporal vulnerability?

-add a methodological flow chart for describing the adopted method.

-What mean SF

-What kind of approach do you employ is heuristics, determiners or statistics?

-What is the DEM resolution that you used

-What kind of satellite images did you use

Appendix M

The reviewers' report 1A

Comments:

<u>Comment 1</u> (grammatical errors)

The following lists some examplesof grammatical errors:

- p. 2, lines 6-7:"The study database was compiled…". Delete study
- p. 2, line 12: "That slope gradient…". The slope gradient
- p. 2, line 16: "than the FR…". Than the FR one
- p. 3, line 5: "In Babors mountains, and in particular, in the Bouandas region,…".Rewrite this sentence
- p. 3, line 5: "imbrication of allochthonous napes…". nappe
- p. 3, line 5: "in Bouandas common". Replace common in the entire text by city
- p. 3, line 6: "especialyy near potential…". especially near potentially
- p. 4, line 9: "And the Triassic is…". Delete "and" and rewrite the sentence
- p. 10, line 9: "gradien". gradient
- p. 11, line 10:"WM". Replace it with MW
- p. 11, line 15:"near roadsat…".near roads at…
- p. 12, line 6: "Based on constant values…".Not clear
- p. 12, line 19: "that proved these factors as…"Rewrite this sentence
- p. 13, line 11:"and seism, for which…".and seismicity, from which…
- p. 13, line 18: "than a tenth of…".than ten percent of…
- p. 14, line 6: "the public". Not clear

<u>Comment 2</u> (Introduction)

1- General state of the art is not well developed. However some references to works that deal with the different approaches used in landslide susceptibility mapping should be done.

2- p. 3, lines 22-23: "A road network of 78.5 km of different types deserves the common". Not clear

<u>Comment 3</u> (Methodology)

1- At the beginning of the Section, the authors state that the number of predisposing factors is 17, whereas the number of these factors is 16. Correct this for the rest of the manuscript

2- p. 5, line 9:Flow direction factor needs a reference

3- p. 5, line 17: MW need to be explained at the first appearance. Do this for the other abbreviations in the text

4- p. 6, line 8: What do you mean with "co-seismic factor"?

5- p. 8, line 10: "multi-steps interpolation" needs a reference

6- p. 8, line 20: “using training dataset, to prepare the prediction rate-curve”. With training data, you can prepare success rate not the prediction rate

7- In equation 4, you must add “j” to the term (FR) and alsoin the text

8- p. 9, line 22:What about calling Section 2.4. “Validation” in order to better reflect their content. Also, this section should be placed after the “results and discussion” one

9- p. 10, lines 3-4: I do not understand the meaning of“If there are two dependent variables, the curve can be drawn using the predicted dependent variables through statistical models”.

Comment 4 (Results and discussion)

1- p. 11, lines 14 and 18: By considering landslide triggering factors, this work is more like a hazard mapping rather than a susceptibility mapping (van Westen, et al., 2008; Nadim et al., 2008; Fell et al., 2008).Make comments

2- p. 13, lines 1-4: Remove this paragraph and move it to “validation” section

Comment 5 (Conclusion, Recommendations and Outlook perspectives)

p. 13, line 5: Too long, not useful

Comment 6 (Reference)

1- p. 3, line 4: The reference “Bourenane 2016” is not found in the reference list

2- Include some references about TWI and SPI factors such as (Moore et al. 1991)

Comment 7 (Figures)

The authors must add the prediction rate curve because the landslide inventory map in this study was randomly divided into, training dataset with 75% for building the models, and validating data with 25%.

major advances that were provided by this work.

GIS based landslide susceptibility has been well researched and documented in the literature and this paper points out the obvious; that slope, lithology, and rainfall are significant contributors to landslides.

Two statistical models were used to validate these significant parameters, but past literature already validated that these parameters are significant.

Perhaps the paper would be more significant if the authors would have demonstrated why their methodology is superior to other GIS landslide susceptibility techniques that are already in the literature.

Trying their methodology on data from an area that already has landslide susceptibility identified through an existing method.

The paper also requires detailed proofreading and editing as demonstrated by spelling and grammatical mistakes.

using Information Value (IV), Weight of Evidence (WoE), FR, LR, Ahp

Appendix N
Review Report 2B

a) why the present region is being chosen? and what is the importance of the region?
Two opposing sentences first, In the introduction part the author stated that "This region suffers sadly from a glaring absence of the geological coverage …….". While, In material and methods part, the author stated that "The used data consists of two geological maps in 1/50000 scale, namely Dalâa (204) and Meskiana (177)" .

no significant absorption features related to the geological features in bands 1, erosol, ……., mention information for the spectral or spatial and radiometric resolution for the sentinel-2 data and their relation with the lithological units in the studied area.

Both Abstract and the introduction parts have no geological background!!
There is no clear objectives including in this proposed study.
There are many grammar and language mistakes in the manuscript which need re-editing.
Please revise your paper strictly according to the attached review comment.

Detailed comments:

Title:

-Please change the title to make it more explicit.

Abstract:

-The principal component analysis (PCA) have been applied on the thirteen Sentinel 2 bands. Why the author used all sentinel 2 spectral bands, there is some spectral bands not related to the geological features (no significant absorption features related to the geological features in bands 1, erosol, ……..,

-The directional filters were applied to undertaken the lineamentary mapping (folds, faults, fractures, etc..). I think it much better/accurate if the author used the lineament automatic detection using Sentinel 2 or lasdat-8 or ASTER DEM

Introduction :

-Please add a concise bakground about GIS and RS works in geological and environmental studies doing in North Africa especialy in Algeria

-The authors mentioned that “This region suffers sadly from a glaring absence of the geological coverage necessary to carry out any environmental research”, is the authors work on the environmental study, if yes why??. The authors mentioned in the abstract section the objective of the study is a lithological discrimination as well as morphostructural analysis in Guerigueur syncline. The objectives is appear confused in the different parts of the manuscript.

Material and methods:

In Sentinel 2 The radiometric resolution of the multi-spectral instrument is 12 bit, enabling the image to be acquired over a range of 0 to 4095 potential light intensity values. why the author exported the data with 8 bit radiometric resolution, it is lost a lot of information (the data range from 0 to 255 values. Please correct

-The author stated that “The work was completed by a correlation with the two existing geological maps (Dalâa and Meskiana)and by an extensive field surveys” while he/she mentioned in the abstract and introduction parts there is no geological mapping/information’s for this study.

Data processing:

-How the authors was reached to this ratio to discriminate the lithological units 12/4 11/3 and 8/4 ratios. Is this band ratio is referenced/tested before or it is new proposed band ratio. The author should discus this part in detailed .

-The author mentioned that “Various lineamentsand anticlines and/or synclines axes were also differentiated using the PCA images, it is not true to extract the structure features from PCA sentinel 2 images, the right technique is edge enhancement, direction filters , high pass filter, there is a lot of methods to extract the lineamentsautomatically using panchromatic remote sensing data (i.e DEM). Please correct.

Results and discussions:

-The radiometric resolution of the Sentinel 2 MSI instrument is 12 bit, why the author saved the geotiff raster image with 8-bit radiometric resolution? 8 bit image values is lower than 12 bit, So, A lot of information lost after this processing!!!. Please correct

The author stated that “ ….. prior recognition …..” which recognition?

-The author stated that” The combination of the different treatments allowed us to obtain a lineament map with more than 41 feature of varying sizes” which treatments? please correct

Conclusion:

-The author stated that “This study gives a new information for identifying new lithological units corresponding to superficial formations previously undiscovered” this conclusion did not appear or proved in the paper, what /where exactly the new discovered lithological units? Please correct or delate this sentense

-“colored directional filters” this a new image processing technique, or it is an enhanced color image?

Figures:

Please add legend to the figure 6

Tables:

Please rewrite tables in text format

References:

Please argue your work by new relevant references, and make your references in accordance with the journal style.

In summary, this paper might be accepted for publication in Geotechnical and Geological Engineering, pending some **minor** changes

Regards

Summary

Compared to the importance of writing in English for scholarly publication, few studies treated the rhetorical difficulties of writing research articles in the Algerian context. Thereupon, this study aims at exploring rhetorical organization difficulties encountered by sciences teachers at the Sétif 1 University when writing their research article. Moreover, the study attempts to identify the different strategies applied to overcome those difficulties. For this end, a questionnaire was designed for teachers of Biology, Earth sciences, and Agricultural sciences; then the rhetorical structure of the first and final versions of their research articles was analysed along with analyzing the comments of reviewers. Finally, teachers were interviewed. The results showed that teachers face problems in structuring the different sections of the research articles, so they seek help from members of their scientific community, follow the structure of published texts, or write in their mother tongue to translate the final product later. The study provided implications for decision takers in higher education.

Key Words : scholarly publication, research articles, rhetorical difficulties, sciences teachers, , strategies.

Résumé

Résumé

Il y a une faible proportion d'études traitant des difficultés de structuration de l'article scientifique dans l'environnement universitaire algérien. La présente étude vise à explorer les difficultés de structure rhétorique rencontrées par les enseignants de la faculté des sciences de l'Université - Sétif 1 - lors de la rédaction de différentes parties de leurs articles scientifiques. Par ailleurs, elle détermine dans quelle mesure ces derniers se conforment-ils aux normes internationales relatives à la structure de l'article scientifique, tout en essayant d'identifier les différentes stratégies adoptées pour faire face à ces difficultés. Il a été utile d'interroger les enseignants des Départements des sciences de la Terre, de biologie et des sciences agronomiques, afin d'étudier la structure de leurs articles dans leurs formes initiale et finale à des fins de comparaison, d'analyse des rapports de réviseurs envoyés par les revues et enfin, quelques entretiens ont été faits avec certains enseignants. Les résultats ont démontré que les enseignants rencontrent des problèmes pour structurer leurs articles en négligeant des passages importants dans les différentes parties de ces derniers. Ils ont donc recours à demander de l'aide d'autres personnels universitaires expérimentés, à suivre des modèles d'articles publiés ou à écrire dans la langue maternelle tout en ayant recours à la traduction. Enfin, l'étude a abouti à des recommandations à l'intention des décideurs des établissements d'enseignement supérieur, des institutions académiques et des concepteurs de programmes de l'enseignement supérieur pour améliorer les formations.

Mots- clés: la rédaction en anglais, articles scientifiques, enseignants de la faculté des sciences , difficultés de structure rhétorique, stratégies

ملخص

بالمقارنة مع أهمية كتابة و نشر المقالات العلمية باللغة الانجليزية في المسار العلمي للأستاذ الجامعي ، نسبة قليلة من الدراسات عالجت صعوبات هيكلة المقال العلمي في الوسط الجامعي الجزائري. و عليه تهدف الدراسة الحالية إلى استكشاف صعوبات الهيكلة البلاغية التي يواجهها أساتذة كلية العلوم بجامعة سطيف1اثناء كتابة مختلف أجزاء مقالاتهم العلمية و مدى مطابقة هذه الأخيرة للمقاييس العالمية لهيكلة المقال العلمي، بالإضافة إلى محاولة التعرف على مختلف، الاستراتيجيات المتبناة لمواجهة هذه الصعوبات.و لتحقيق هذه الأهداف، تم اللجوء إلى استجواب الأساتذة من قسم البيولوجيا، قسم علوم الأرض، و قسم علوم الزراعة، دراسة هيكلة مقالاتهم في صيغتيها المبدئية و النهائية بغرض المقارنة، تحليل تقارير المراجعين المرسلة من المجلات ، و أخيرا إجراء مقابلات مع بعض الأساتذة. وقد بينت النتائج أن الأساتذة يعانون من مشاكل في هيكلة مقالاتهم و ذلك من خلال إغفال كتابة مقاطع مهمة في مختلف أجزاء المقالات و لهذا يلجؤون إلى طلب المساعدة من غيرهم من ذوي الخبرة من الوسط الجامعي، إتباع نماذج لمقالات منشورة، أو الكتابة باللغة الأم و اللجوء إلى الترجمة بعد ذلك. و في الأخير خلصت الدراسة إلى توصيات لكل من صناع القرار في مؤسسات التعليم العالي، المؤسسات الأكاديمية، و مصممي البرامج في التعليم العالي.

الكلمات المفتاحية كتابة و نشر المقالات العلمية باللغة الانجليزية ،صعوبات هيكلة المقال العلمية ، الاستراتيجيات، أساتذة كلية العلوم،