Engineering Master Student's Perceptions and Attitudes toward Research Methods. The Case Study of Faculty of Sciences and Technologies, Tangier (FSTT)

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ABSTRACT: The central concern of this paper is to investigate students' perceptions about the Research Methods Course taught in English at the Faculty of Sciences and Technologies, Tangier (FSTT). The study results reveal that students find research methods extremely valuable as there has been a genuine attempt to seriously participate in mini collective research projects under constant supervision by their mentor. Students expressed a predisposition toward research. This is merely indicative of their prior mindfulness of the paramount importance of research not only in their academic trajectory, but also in their professional endeavors. Students' familiarity with and exposure to research terminologies, such as research proposal, literature review, citing and referencing, research designs, data collection methods, data analysis and discussion, and many more has been fundamentally crucial to preparing them to take part in research activities and practices. The researcher utilizes both quantitative and qualitative research analyses by dint of an online questionnaire and focus group sessions in order to be at a better position to investigate the issue at hand, and simultaneously create an opportunity of growth. Furthermore, it is conspicuous that the findings of the current study indicate more useful implications pertinent to students' engagement, participation and commitment in the Research Methods Course.

KEYWORDS: Research methods, Perceptions, Research process, Academic research, Teachability Hypothesis (TH)

1. INTRODUCTION

It is axiomatic that research has become an inseparable component in higher education due to its tremendous impact on education and scientific progress in a wide range of disciplines. University students, across the globe, are perpetually engaged in research activities in order to enhance their academic skills and develop critical thinking. In this regard, Moroccan students, in particular, are more than ever in need of a sound grasp of research methods to both satisfy the requirements of their degree, and simultaneously make quantum leaps in academia, scholarship and research (thesis publishing) as a whole. The process of writing research-based arguments moves students from memorization to a more holistic understanding of scientific concepts. Furthermore, constructing scientific arguments requires knowledge and use of scientific theory (Duschl, 1990). This certainly requires a good understanding and application of research methods, including multidisciplinary concepts, approaches and theories.

It must be noted that research was embraced within university in addition to the task of teaching in the late nineteenth century after the first academic revolution (Etzkowitz, 2003). Since then, the significance of research has immensely become momentous by scientific communities (Bahadori et al., 2015). According to the Organization for Economic Cooperation and Development (OECD) (2002), research is the creative work that is undertaken on a systematic basis with the purpose of increasing knowledge, and to devise new applications. Additionally, the Advanced Learner's Dictionary of Current English defines research as "a careful investigation or inquiry specially through search for new facts in any branch of knowledge." In the same manner, Redman and Mory define research as a "systematized effort to gain new knowledge."

The purpose of this paper is to investigate whether the Research Methods Course taught in English at the Faculty of Sciences and Technologies, Tangier (FSTT) is useful for students, and if the answer is in the affirmative how does the aforementioned course enables students to participate in research activities. Similarly, the current paper seeks to examine epistemological needs among students in research and learning. In effect, the need for research has unquestionably become vital and inextricably interwoven with education to attain its goals and objectives, rebuild confidence in public schools, adapt to cultural diversity, educate for self-identity and individual realization, re-establish faith in human, moral and democratic values, bring about changes in racial attitudes, achieve the goals of quality and relevance, and meet the challenges of the future world of accelerating scientific and technological change (Boykin, 1972). Research incorporates data collection, analysis, interpretation, and assessment procedures conducted in an analytical manner so as to find solutions to a problem (Burton and Walters, 2013; Rezaei and Miandashti, 2013). These research steps are primarily important as they form the backbone for any research project.

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1.2 Research Questions

As for the research questions, this study revolves around three central ones.

1-To what extent do students consider knowledge of research to be useful and valuable?

2-How do students' perceptions and attitudes of research methods change through participation in mini research projects?

3-Does the Research Methods Course help in the process of language acquisition among FSTT's students?

2. LITERATURE REVIEW

It is needless to say that research has largely contributed to the advancement of a myriad of scientific and technological domains. A plethora of studies have dealt with students' perceptions and attitudes toward research (Neumann, 1994; Jenkins et al., 1998; Lindsay et al., 2002; Robertson and Blackler, 2006; Buckley, 2011). It is striking that a considerable amount of university teaching on research methods prioritizes more knowledge transfer than the application of the acquired knowledge in real-life research projects (Wagner et al., 2011; Campbell, 2002). This may cause students to memorize only research methods without having a full practical understanding, which can result in form and format issues. In research methods, Burns (2000) claims that the researcher has to deal with three main elements. The first is the methodology knowledge. The second is the research procedure. Then, the third is the data analysis technique.

According to Murray (2002), the main purpose of research methodology can be found while answering the questions below.

1. What is the goal of your research?
2. How do you do your research?
3. Why do you choose this research methodology?
4. What is/are your research question/s?
5. How can your research methodology be implemented on your research question/s?
6. What topics are proper to explain the methodology on your research?

Many academics believe in the correlation between teaching and research (Jensen, 1988; Neumann, 1992;). In this regard, Neumann (1992) showed that academics conceive relations between research and teaching in three distinct ways: (1) global connection, (2) tangible connection, and (3) intangible connection.

No one can deny that research methods are inextricably linked to thesis or dissertation writing. This link allows students to conduct research in congruency with a proper use of research methods. Oftentimes, graduate programs require good mastery of academic writing, which tends to be challenging among students even for those whose English is their mother tongue (Casanave, 2003).

More importantly, writing has a considerable position in language teaching due to its significance and complexity at the micro-linguistic (e.g., grammatical and lexical) and macro-linguistic (e.g., relevant information and written genres) level (Dyson, 2019). Naturally, second language learners undergo similar linguistic developmental stages: Preproduction, Early Production, Speech Emergence, Intermediate Fluency, and Advanced Fluency (Krashen and Terrell, 1983). These stages are deemed to be the underlying principle for language teaching. Furthermore, foreign or second languages are generally learned in sequences, which have been described by (Johnston, 1985) as "developmental stages". In short, this suggests that language acquisition is sequential and systemic in which grammatical knowledge is fundamentally core to language production.

Linguistically speaking, Pienemann (1984, 1989, 1998, 2015) formulated the Teachability Hypothesis (TH), which predicts that, "instruction can only promote language acquisition if the interlanguage is close to the point when the structure to be taught is acquired in the natural setting" (Pienemann, 1984, p. 37). This suggests that a second language learner cannot acquire a structure that is at a higher level than their processing ability. Language acquisition also requires a natural learning environment where the learner is exposed to authentic and real-life instruction. Only this way, second language learners can truly acquire language in lieu of rote memorization and reproduction. If a learner can reproduce some morphosyntactic structures soundly, this does not mean that they have actually acquired them (Pienemann, 2015). In fact, teaching structures that do not follow natural sequences are capable of jeopardizing language acquisition (Hahn, 1982; Felix, 1982; Wode, 1981, cited in Pienemann, 1984, p. 209).

According to Kumaravadivelu (2008), Pienemann accounts for the relationship between learning and teaching as follows: If the learner is at the appropriate acquisitional stage, instruction can develop acquisition with respect to (a) the speed of acquisition, (b) the frequency of rule application, and (c) the different linguistic contexts in which the rule has to be applied. Consequently, any learning task which contradicts these principles is not learnable; it would ask too much of the learner, and hence it might have detrimental effects on both instruction and developmental readiness of learners (Pienamann1984, cited in Kumaravadivelu, 2008, pp. 77-78). Similarly, Kumaravadivelu (2008) argues that although the TH has led to a growing body of research, it suffers from validity and applicability defects due to the small size of the sample alongside practical constraints, such as the difficulty of determining learners' current state of grammar or interlanguage.

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3. METHODOLOGY

This section is primarily devoted to data gathering methods. It presents the research sample, target population, and instruments. The use of quantitative and qualitative designs forms the crux of the current research project in which bona fide data was collected by means of an online survey that was sent to research participants through Goggle Forms and focus group sessions that were conducted online due to COVID-19 preventive measures in Morocco in general, and at the FSTT in particular.

3.1 Participants

In the present study, the population sample included 1st year IT Engineering and Geo-Information Science students. The sample primarily consisted of almost all participants in order to yield generalizable findings. The gender and English proficiency variables will not be taken into consideration. The participants were selected on the basis of taking the Research Methods Course either in the **1st** or **2nd** semester.

3.2 Research Instruments

The choice of the research instruments is the point of departure of this research project. Given the nature of the study, exploratory, two chief research instruments were therefore chosen, namely a questionnaire and a focus group (please, see the subsections below). Such instruments were used in order to yield reliable results and go in tandem with the research questions.

3.2.1 Questionnaire

A self-administered online questionnaire was distributed to research participants at the FSTT online. It included exclusively close-ended questions. These questions were divided into four general sections: Background Information, Attitudes and Perceptions, Interest and Importance and Recommendations. Female participation forms 45,9%, while male one forms a slightly closer percentage 54,1%.

3.2.2 Focus Group

The researcher sent an information sheet to interested participants. The number had been reduced to six participants for the purpose of creating a homogenous group. There were 3 males and 3 females. Questions ranged from research methods' perceptions to challenges. The Focus group session was done online due to COVID-19 preventive measures. The questions were divided into two main sections. The first section entailed two questions about students' perceptions. The second section also included questions about the challenges that students particularly face in research methods instruction.

4. DATA ANALYSIS AND DISCUSSION

4.1 Data gathered by means of an Online Questionnaire (Google Forms)
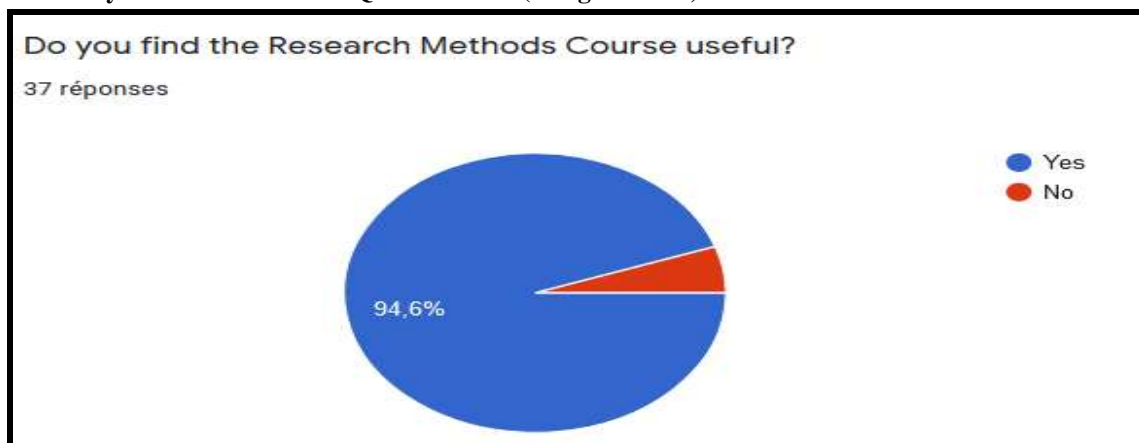

Figure 1: Usefulness of the Research Methods Course among Students

It is quite striking from the chart that nearly the majority of students find the Research Methods Course useful. This is fathomable as this particular course is profoundly embedded in other courses in the curriculum and is inextricably interwoven with research, which apparently forms the backbone of education. Good mastery of research methods undeniably enables students to conceptualize and visualize their learning in the form of reports, PPT presentations, homework assignments, mini and capstone research projects, and so forth. In fact, this high percentage, 94,6%, is revealing that Master students at the FSTT are already aware of the significance and value of research methods because at the end of their academic training they will be required to write an end-of-study research project in order to fulfil the requirements of their degree. Other than this, learning how to do research will be useful even after students finish university. It is an empowering tool that not many of us have. As a matter of fact, students should study more research methods because not having enough knowledge on the basics of research will affect both the form and format of their capstone projects (methodology and results). Similarly, at a later stage, students will be required to publish in internal indexed journals and

domain knowledge and expertise will play an influential role in the publishing process. With that being said, teachers and students should together spend a quality time exploring all possible venues in the aforementioned course so as to be able to reach the intended outcomes.
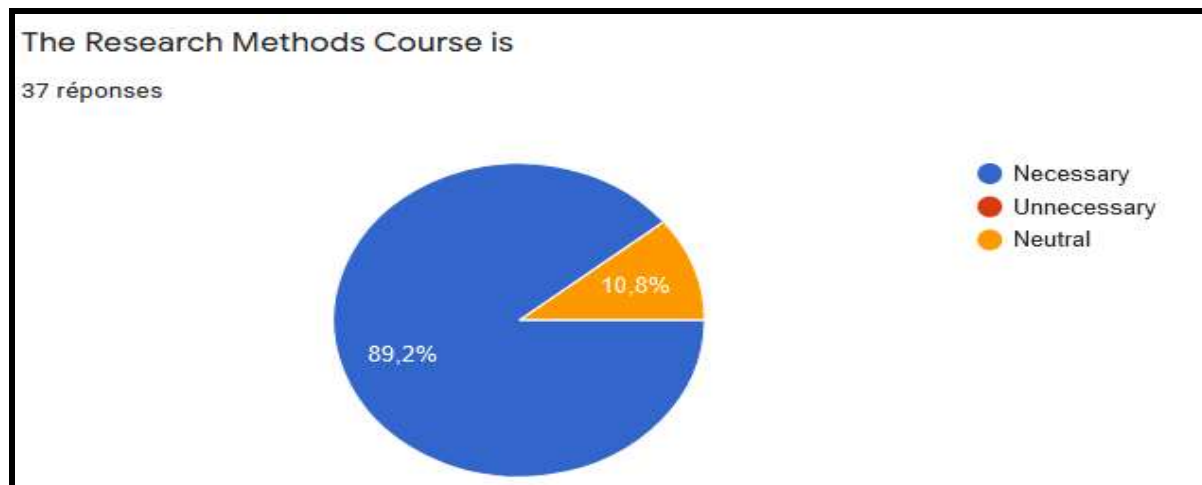

Figure 2: How Necessary the Research Methods Course is?

The chart above attempts to determine the extent to which the research methods course is necessary. It is obvious that 89,2% of the participants consider the aforesaid course to be highly necessary. This necessity is potentially perceived by students in learning new research concepts, techniques, approaches, designs and theories, and at the same time apply them in real-life problems to eventually provide solutions and recommendations when need be. Likewise, students express their necessity toward research methods because they are constantly challenged to use their critical thinking, problem solving and extensive reading skills to problematize, investigate, collect information, analyze, interpret, discuss data and write conclusions. In fact, reading and writing shape a large part of any given research, and hence excellent mastery of the two skills unquestionably helps in the writing of the literature review, which appears to be a challenging component of the entire research project among the FSTT students, especially the ones that the researcher mentored and supervised. In the same line of argument, students' writing skills can oftentimes be an impediment toward writing proficiency and translation could be used along the way. In this regard, Bachiri and Tribak (2020) argue that "translation entails transferring a range of language characteristics and constituents into another, and since Arabic and English are distant and different languages, imparting elements from Arabic, for example, into English may invoke many structural and semantic problems ranging from sentence construction, word order, to meaning making" (2020, p. 19). This suggests that translation can have a tremendous effect on meaning and scientific precision of data. Therefore, it has to be carefully used, particularly when dealing with data analysis and discussion as distortion can directly influence both validity and reliability. Perhaps another element that could be perceived with respect to research methods is that students enjoy thinking about researchable topics that resonate with them, and this motivates them to gradually build different parts of a research project, such as a research proposal, a literature review, a methodology, data analysis and discussion, a conclusion, references and appendices if any. In so doing so, students develop concrete understanding of research, learn the skills of research from committing different errors along the journey, and experience a wide range of feelings that the majority of researchers feel, such as trepidation, stress, etc.
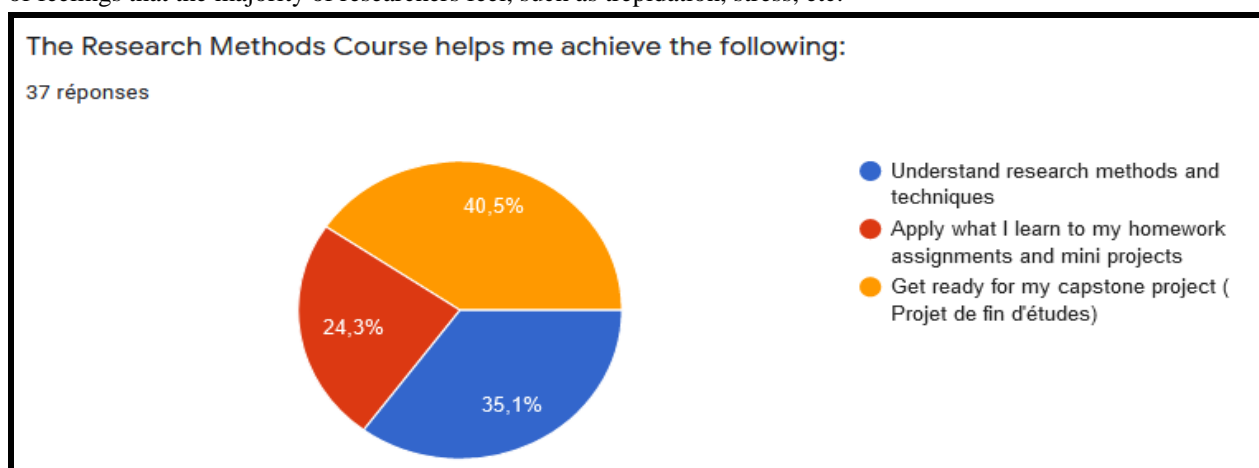

Figure 3: Purposes of the Research Methods Course

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It is clearly conspicuous from the chart above that the highest percentage, 40,5%, is given to "Get ready for my capstone project". Almost half of the research population considers research methods to be an essential step toward thesis writing. In fact, making such a choice is reasonable as students have to be previously equipped with the fundamentals of research, such as writing a statement of the problem and hypotheses, data collection methods, sampling techniques, data analysis and research ethics as a whole prior to embarking on their capstone project. Success in thesis writing will not only guarantee an excellent grade, but it will also pave the way for post postgraduate studies in which students have to be already familiar with research processes and procedures. As a result, this will undoubtedly maximize their chances of being chosen as final candidates as rivalry tends to be intense. "Understand research methods and techniques" was ranked second with a percentage of 35,1%. This is genuinely telling of students' interest in this particular course to do well in class, and at the same time incrementally develop comprehension toward different issues related to research. In fact, the usefulness of research methods is reflected in many forms that will help the student-researcher carry out a scientific research project in a complete and comprehensive manner. The importance of research methods is related to the student-researcher's development of hypotheses after collecting data and ensuring its validity. Furthermore, such methods contribute to encouraging the student-researcher to peruse previous scientific studies that deal with the same phenomenon or variables that they deal with in scientific research. This way the student-researcher would be more familiar with the existing methods in the literature and use them properly and effectively. "Apply what I learn to my homework assignments and mini projects" received the smallest percentage, 24,3%, yet it is still indicative of how such methods can be useful in helping students do research on various topics pertinent to other courses. Nowadays, academia is heavily hinged upon research and students' successful attempts in carrying out sound research projects can grant them the potentiality of achieving high scores. Similarly, obtaining accurate information from many sources and references that are related to the topic with which the researcher deals with will expand the student-researcher's perceptions in predicting what will happen in the future in relation to the problem under investigation based on data gathered from various sources and via different methods that he/she uses. It must be noted that graduate programs, in Morocco, tend to be intensive in nature and require from students to write a lot of reports and research projects, individually and collectively, and thus being acquainted with research methods will greatly help students do their assignments with relative ease.
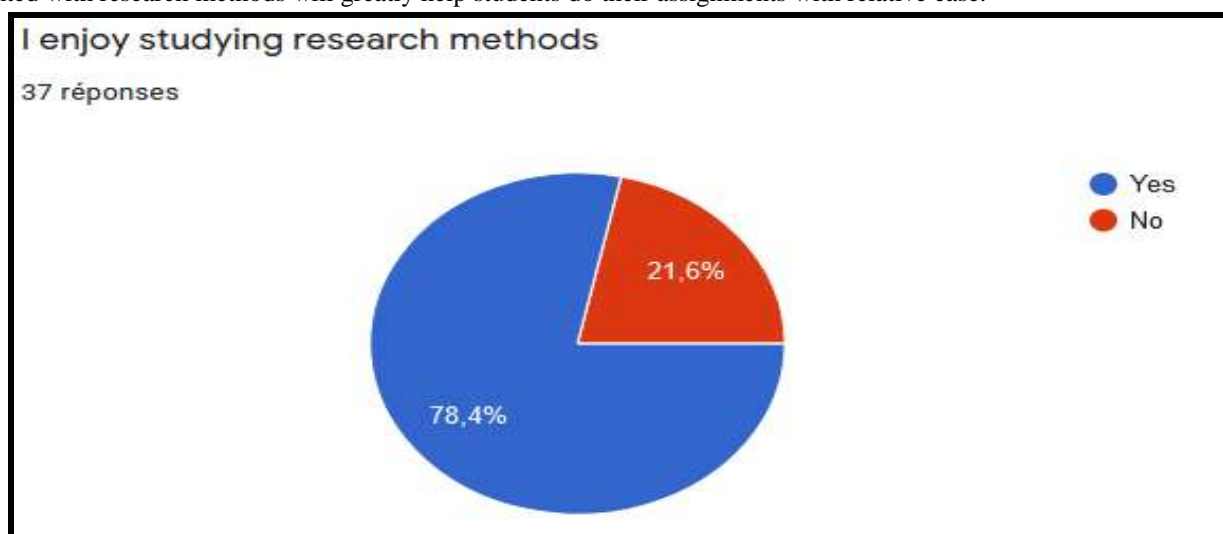

Figure 4: How Enjoyable Research Methods Are for Students?

As seen from the chart, 78,4% of the research population regard research methods to be enjoyable in studying. This optimistic and positive predilection toward research can generally be indicative of students' willingness to explore, deepen and enrich their knowledge about the techniques and methods of research, which will allow them to formulate sound hypotheses and critically read previous studies and use them for their interest. Having class workshops and seminars help concretize the learning of research methods, especially if the pedagogy used is both communicative and student-centered. In addition, enjoyment can be enhanced through dividing students into small groups where they investigate real-life topics of their own choice, and this unequivocally increases their motivation and gives them a sense of achievement, particularly when feedback is given in parallel. Adopting peer-learning in class seems to be encouraging and change the classroom dynamics for the better as students-researchers feel more autonomous and openly participate in class discussions. After submission, students are given the chance to correct their own mistakes via engaging them in debates about the research methodology they have opted for, and from there we come to an agreement altogether about the most appropriate methodology that would help them respond to research questions and attain the objectives of their study. This teaching approach enables students to learn on their own slowly, yet surely so as to explore different venues of the Research Methods Course. In fact, students find it enjoyable doing research about a topic of their own choice and getting help from

their supervisor without having him/her take the lead seems motivating. Instead, the supervisor can instruct and correct concepts and methods, and most importantly guide students toward interesting and relevant research materials. By doing so, the student-researcher will abundantly learn on their own and empirically experience what is like to do academic research from an embryonic stage to a final product.
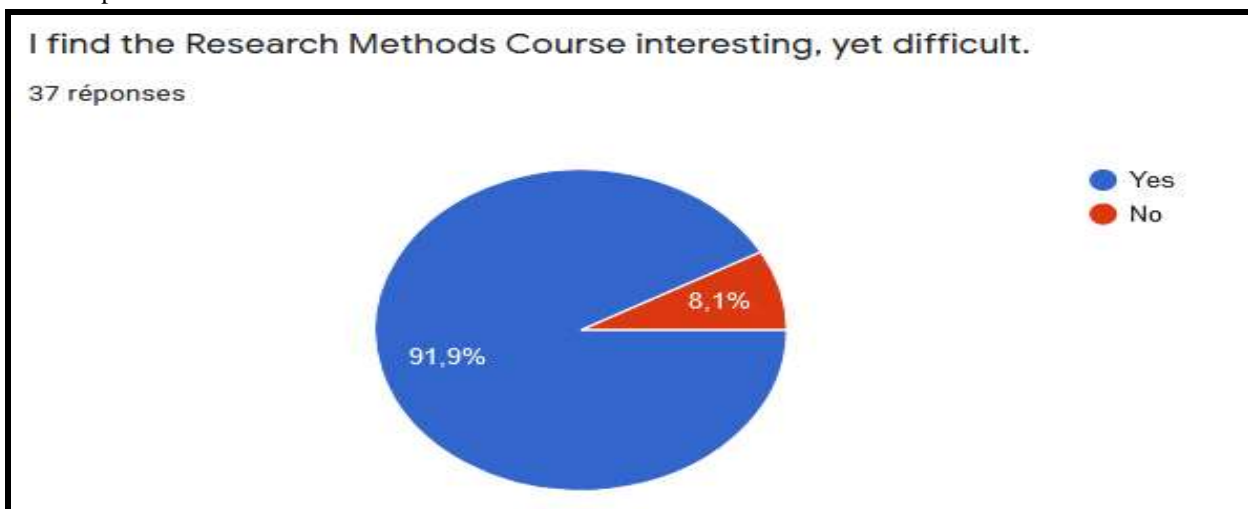

Figure 5: How Interesting and Difficult the Research Methods Course Is?

It is noticeable that the vast majority of the research participants find the Research Methods Course interesting, yet difficult with a percentage of 91,9%. This potentially suggests that students' perception of interest lies in the fact that research stimulates their brains and enhance their critical thinking and problem solving skills. It also improves their reading and writing skills constantly via exposure to a wide range or printed and non-printed materials. Similarly, studying research methods empowers and motivates students to conduct graded research projects that enable them to implement what they theoretically learn in class alongside choosing their own design and methodology that best serves the research questions and objectives. All these elements increase students' interest as they develop a sense of ownership toward their projects.

Difficulty of research methods can be viewed in understanding the basics of research and successfully implementing different methods and theories in research. In the same manner, using statistical software, such as SPSS, R, or MATLAB can be challenging to a lot of Master students. This statistical computing software requires formal instruction and practice. Before the student-researcher embarks upon working on a certain research topic, he/she should do a considerable amount of reading in order to have background knowledge to eventually be able to situate his/her research topic to find the gap, and simultaneously avoid redundancy and reproduction of previous studies, especially if the research topic has extensively been consumed in the literature. The student-researcher ought to be able to write a coherent and effective research proposal that has to be initially endorsed by their advisor. From there, the student-researcher has to find a good and relevant title that briefly sums up the whole research project, then comes introduction and division of chapters. Finally, there comes data collection with analysis and discussion. All these research steps and guidelines pose obstacles to novice students-researchers. However, with practice and exposure, Master students will be gradually able to comprehend these research methods and properly apply them to whatever academic task they may have.
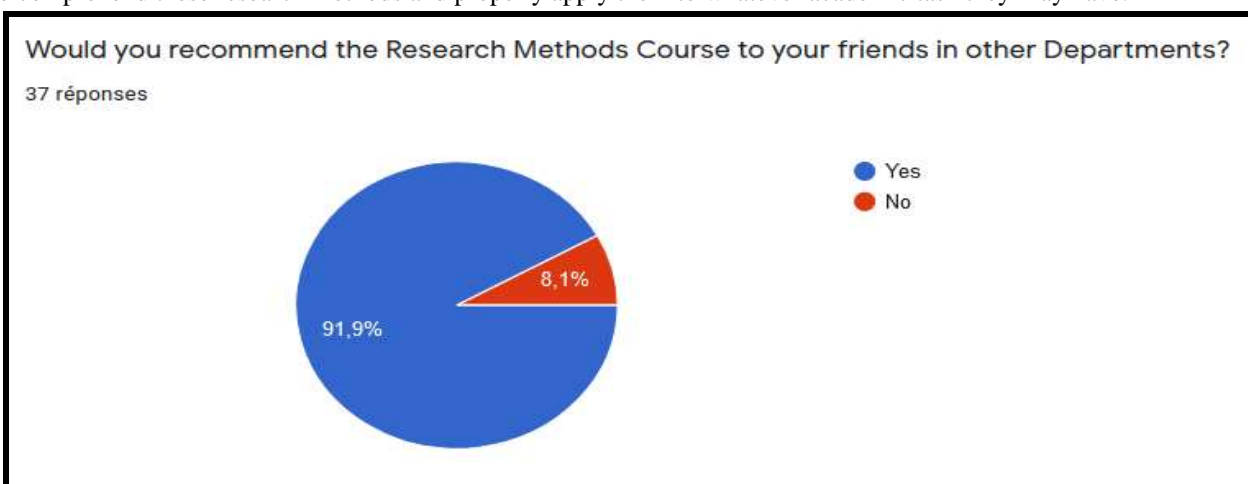

Figure 6: Recommendations on the Research Methods Course

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It is surprising from the chart that 91,9% of the research participants would willingly recommend the Research Methods Course to their friends in other Departments. In actuality, the impetus behind including such a question in the questionnaire is to investigate whether students enjoyed studying research methods, and whether the experience was also valuable to them. Naturally, people would generally recommend something to others only if the experience has been pleasant and satisfying. Based on the percentage above, it is clearly expressive of the fact that the aforementioned course was an interesting and valuable experience for students. Their exposure to theoretical and empirical fundamentals of research has fueled their critical thinking and problem solving skills. It has also challenged them as individuals, students and intellectuals. Their continuous efforts to find the right research topic would urge them to read abundantly in the literature so as to find relevant materials to review. In the same line of thought, their attempts to gather quantitative and/or qualitative data have been interesting experiences in the sense that they designed their own questionnaires and interview questions. Moreover, their knowledge of research gradually developed through immersion and exposure. Overall, the optimistic perspective on research methods taught in English at the FSTT is reassuring and motivating as more investment and research should be made at the level of engagement and exposure. Perhaps more seminars and workshops should be organized for the benefit of students where more technical issues related to research, such as sampling techniques, statistical software analysis, referencing, publishing, and so forth. Such seminars and workshops will make the learning of these technical issues more significant and empirical.

4.2 Data gathered by means of Focus Group: Analysis and Discussion

Most participants found the Research Methods Course interesting because it possesses practical nature and is relevant to their studies. According to one research participant, he said "Moreover this course is very practical for our studies as well as for our future, when we become PhD Students." Similarly, another research participant reported that "This course has been a great introduction and an eye opener, especially in the definition of each segment, and what its purpose is. In a scientific major, this course is very useful to those who are oriented toward research fields." This palpably suggests that students found the aforementioned course to be useful and valuable, especially their exposure to data collection methods and research ethics. Other questions targeted the challenges that students encounter in doing research. As far as participants are concerned, they reported the following testimonies:

"The most difficult part of this course is the literature review since it requires not only transferring knowledge, but also critically evaluating the given progress of research in that specific field of theme. Since the sources are almost never ending, and to select the important ones in one's research, and specify which information to deduce presents a challenging task." Another participant views Qualitative "data collection methods" to be challenging, especially "uncontrolled observation". In fact, these two answers reveal both the theoretical and empirical part of research as they both require excellent reading and writing skills. In effect, to be able to write a quality literature review, one has to extensively read in the literature not only to create content, but also to find the gap (where a specific research topic has recently stopped to avoid redundancy). Data collection methods also demand a thorough understanding both in theory and action, and for this reason students would potentially find them difficult to apply in research.

The last question that was addressed in the online focus group session was "How do you think this course will help you with thesis writing?"

This specific question received varied answers. To begin with, "This course certainly will help me in thesis writing because I will be aware of the research methods and mistakes to avoid which means <gain time and energy> and have a quick wit with the supervisor or the co-supervisor." Another participant reported "Having a known structure to your research helps a lot with progressing in the thesis writing, since you know each part and what purpose it got. Similarly, a different participant "considers this course to be instructional as there was a lot of emphasis on ethical implications about research in which the teacher always warned against, such as plagiarism, for it destroys the reputation of both the researcher and their work." Given all these testimonies, one can clearly state that the Research Methods Course has been instructional in many ways (research ethics, literature review writing, data collection methods, data analysis, research proposal writing, and so forth.). The teaching of this course has profoundly disclosed that students enjoy studying research and doing projects of their own choice. The commitment rate was really high as students were constantly assigned mini research projects and homework assignments, which were successfully accomplished by them. In a nutshell, there should be seminars and workshops at the level of the FSTT to encourage students and professors to share experience and benefit from the expertise of their mentors.

5. CONCLUSION

This study has been an attempt to investigate students' perceptions and attitudes toward the Research Methods Course taught in English to 1st year Master students at the FSTT. The study findings indicate positive signs and a strong predilection toward the aforementioned course. In fact, students enjoy studying research methods and consider this particular course to be extremely preparatory and instructional, particularly with respect to thesis writing. Their exposure to the fundamentals of research and its techniques has enabled them to gradually assimilate that research is both theory and practice. It is also a step-by-step process whose

nature is modifiable throughout the stages of a given research project. Likewise, students have learned that research is enormously banked upon ethics and avoiding plagiarism as much as possible would always lead one's research project to a safe harbor. More importantly, research requires good reading and writing skills as the latter would help the student-researcher to critically review and assess previous relevant studies, and at the same time provide their own understanding, interpretations, critiques, and conclusions. In so doing, students incrementally learn how to become autonomous learners, and this ipso facto enables to contribute to the field they work in. In the same manner, helping students properly fathom out data collection methods in qualitative, quantitative, or experimental research in both theory and practice seems to change the classroom dynamics. Students become more attentive, interactive and engaged. As a result, this undeniably creates an unshakable foundation for class participation and debates.

Most importantly, it was conspicuous to the researcher from class discussions and study data, by means of an online questionnaire and a focus group session, that literature review writing has been a challenging component for students as the latter requires a satisfactory amount referencing and citing knowledge (MLA, APA, etc.) and highly specialized degrees of inscription and study skills, such as quoting, summarizing and paraphrasing. Such skills would unquestionably enable students to use written and non-written materials effectively, while simultaneously abiding by ethical guidelines of research.

In conclusion, the researcher would like to stress that students are still making baby steps as they are novice researchers, but full of passion and willingness to pick up new things. Therefore, there should be more genuine, inclusive and participatory initiatives and practices to involve them in community-oriented projects, the American model, in engineering, biology, food processing, car manufacturing, environmental studies, and so forth for the purpose of learning how to do research in practical manners, and at the same time contribute to local, regional, and national development that would ultimately be conducive to the growth of the GDP of Morocco.

6. ACKNOWLEDGEMENTS

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Appendix A

Online Questionnaire (Google Forms)

1-Gender:
-Male
-Female

2-Age
… years old

3-Level of Education
…………………………………………………………………………………………………

4-Do you find the Research Methods Course useful?
-Yes
-No

5-The Research Methods Course is
-Necessary
-Unnecessary
-Neutral

6-The Research Methods Course helps me achieve the following:
-Understand research methods and techniques
-Apply what I learn to my homework assignments and mini projects
-Get ready for my capstone project (Projet de fin d'études)

7-I enjoy studying research methods
-Yes
-No

8-I find the Research Methods Course interesting, yet difficult.
-Yes
-No
Thank you for your participation.

Appendix B

Focus Group Questions

First Section:
1) How do you find the Research Methods Course?
2) What was the most difficult component of the Research Methods Course?

Second Section:
3) What was interesting about the Research Methods Course?
4) How do you think this course will help you with thesis writing?

Thank you for your participation.