

Writing scientific thesis/ dissertation in biology field: Discussion writing problems

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Abstract:

Theses or dissertations contain many chapters; the most vital and important one is the discussion chapter. Most other chapters were previously investigated for writing problems and the results revealed so many mistakes in the writing process. However, the discussion chapter still hasn't been studied in these theses or dissertations. Therefore, the context of discussion writing was studied and analysed in 124 theses and dissertations of Iraqi postgraduate students in the field of biology to assess the major problems and mistakes facing the discussion text writing. At the same time an interview was carried out with 114 students from the same field to obtain solid idea about the awareness of those students in the discussion writing style. The study involved many factors and criteria used internationally to analyse the situation of discussion writing. The results revealed that most students have little knowledge or no idea about discussion writing process. The writing process showed many mistakes contextually, structurally and scientifically. It was well realized that the students, before they wrote their theses or dissertations, hadn't previously possessed any information about the writing discussion text and they wrote them as previous student did regardless of they were correct or not. This study concluded that postgraduate students wrote their theses or dissertation in unsystematic random style independent of proper writing rules or criteria indicating their ignorance to the right style of writing proper discussion text. This invites the Universities to evaluate that and establish a plan to make the students in a level that they have sufficient awareness of scientific writing.

keywords: writing problems, Writing scientific thesis, Writing scientific dissertation.

Introduction:

Every research aims to obtain solutions for specific problem that has been targeted to be investigated. Obtaining the results is the an important task by the researchers, however these results have no real value unless the researchers interpret them correctly through giving the meaning and importance of these findings. The interpretation of the research results is called discussion. Usually every scientific article, thesis or dissertation must contain discussion section in their structure and usually written as last section.

Researcher puts the hypothesis, define the aim, select methodology, doing the experiments, collecting the data, doing statistical analysis, draw the tables, and showing figures or pictures, all these are consider as raw data. All those tasks are good but what do they mean to the readers. These results must be discussed by the way that the audience are able to understand meaning of these results, evaluate the outcome of

the findings, appreciate the efforts of the researchers, realize their relation with other disciplines, can draw many conclusions and making suggestions and open new doors for future studies (1,2). Moreover, readers often face difficulty to follow the result presentation (1,3) therefore discussion section can offer the best tool to facilitate the understanding of the findings through clarifying the meaning and importance of research work (2, 4, 5) although it is considered as most difficult chapter in the TDs. Therefore the discussion section must be written correctly, precisely, readable, motivating and coherently. Researchers during writing their articles usually face a challenge of presenting convincing discussion section. The purpose of writing the discussion is to convey the philosophy of project aim and resultant from the mind of the researcher to the readers and the researchers must remember that the discussion is written to the readers not to themselves (2, 6). The discussion is the message that researcher tends to send to other that must represent clear and robust opinion about the resultant of the project to give obvious impression about the importance of the study. Organisation and writing the discussion are so important to be paid high attention. The main feature of successful discussion is to summarised and

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focused on the studied subject and in the same time it should be clearly written to involve well stating, explanation, enriching, supporting, fruitful and defending the answers that raised in the introduction then followed by discussing the findings with other directly relevant and important references. Writing the discussion style is against the style of writing introduction, it starts from specific narrow angle to general and wide side like inverted funnel.

In spite of the discussion chapter is written at the end of the article or thesis/dissertations, the researcher must start thinking about the way of writing discussion and what must be written in from the moment of starting the project (5,6). Every student must think well before starting discussion writing; many questions must be raised that need scientific answers by the students. First question is what the student has done, then followed many other questions like why the student has done this project, how the student performed it, what are the results, are results give answers to the research questions, which results are compatible with other literatures, what is the new, can these results be ready for practice and what are the implications, do these results show any meaning, what are the main meanings, do this project open new doors for more studies, what are the conclusions, what the recommended steps, what are the practical limitations, and finally the student must add draw a road map for discussion according to the previous criteria.

The problem of inappropriate discussion section writing was studied in other countries (7), they showed the absence of real discussion in the PhD thesis. The problem of writing research articles by language other than mother language may bear the possibility of translation problem or poor expression that can face the researchers (8). Postgraduate students in the field of biological sciences in Iraqi Universities must submit theses or dissertations as a partial fulfillment to obtain their degree. The student must follow the standard guideline for writing their thesis or dissertation based on the instructions issued by the University authority. Hence every thesis/dissertation contains many chapters including, abstract, introduction, literatures review, methods, results, discussion, conclusions, recommendations and references. Every chapter must be written by following standard scientific writing style to be well understood. Previous studies have shown that most of those postgraduate students did not follow proper writing styles and revealed poor writing pattern (9,10, 11,12,13,14). Therefore, it is expected to find such problems in constructing a cohesive discussion section in TDs writing process. In spite of the importance of the discussion chapter, few articles are available focusing on the discussion writing conditions. Most published literatures about discussion writing style can be found as online sites like University instructions, no referenced personal ideas, general advices and journal publishing rules. Most of those literatures cannot be used as academic references in scientific article writing. This study therefore aimed to sail inside the main problems that faced postgraduate students during writing the discussion chapter.

Subjects and Methods:

Thesis/Dissertation

The discussion chapter was carefully studied in 124 TDs in the field of biology. Biology field includes medicine, biological sciences, veterinary medicine, pharmacy, dentistry, agriculture and other minor related branches. This project was conducted on the theses or dissertations published from 2007 to 2012 in the Iraqi Centre for Cancer and Medical Genetics Research (ICCMGR). These theses and dissertations were accomplished under the supervision of professors from different specialties in biology fields from different Iraqi Universities or Colleges.

The discussion text in each TDs was carefully read, assessed and analyzed in order to reveal any errors in the context of writing process. Many international guidelines for scientific writing (15, 16, 17,18) were used for standardization, matching, criticism and comparison.

Students' interview

The interview was carried out on 114 postgraduate students (Master and Doctor of Philosophy) from many Universities and from different biology fields as mentioned above. The interview was documented only with students who showed their agreement to carry out that task. The students were asked to answer seven questions:-

- 1- What do you mean by discussion chapter?
- 2- Have any proper idea about how to write discussion chapter.
- 3- Have you read any articles or guidelines about how to write discussion context in your thesis or dissertation?
- 4- Do you know the standard guideline for writing the discussion chapter?
- 5- If I have the authority I can say it is not necessary to write discussion at the end of thesis.
- 6- I wrote the discussion because the previous students did it.
- 7- What is the rank can you give to the discussion chapter among other chapters according to their importance?

Results:

One of the most writing style in these TDs detected in 108 TDs (87%) was the postgraduate students started their discussion writing with giving long introduction or justification for their project. They tried to explain and to give interpretation to the readers about why they had done this project or the used such tests. While 13% of students started the discussion by discuss their results directly. In other hand 77 TDs (62%) of the students showed that students reiterated writing almost all the results and then they started to discuss them. In 114 TDs the students used mostly the term "agree with" or "disagree with" to compare with other findings by other researchers. In addition the discussion style in 41 TDs (33%) was entirely constructed just depending only on comparing style by using "agree with" or "disagree with" term by explaining the compatibility with other studies without adding further interpretation. The result revealed that 76% of the students (94 TDs) followed a special discussion writing style by repeating using the state-

ment (similar result was reported by others) or the (same results were documented by others) even their results do not require any comparison. Moreover, 32 students (26%) tended to explain their results and then tried to insert other findings by other researchers regardless of the importance of these references or even they are unrelated to their findings. Almost all (114) TDs (92%) revealed loss of textual coherence through the interpretation of the results; the student jumped from one statement to another with no sequential and coherent explanation. Concerning the referencing style, all students used large number of references which were not mentioned in the literatures review. More than half (65)TDs (52%) showed the students used specific reference more than three times and in 14TDs (11%) reach up to eight times in the discussion. The consistency of using the verbs was absent in 113TDs (91%) which varied between present, past and past perfect tense. Not all students discussed or gave interpretation for all their results, it was revealed that 62 students(50%) tried to interpret only selected findings of their results and try to neglect other results. Concerning the limitations, all students just referred to some problems they faced in their study even these problems were not directly related to the results' obstacles. However all students did not mention or even referred to the hypothesis of their study and they did not try to give answer to the hypothesis. In another hand all students showed defect in paragraphing writing. Sometime the students wrote separated paragraphs although they must be joined together while in another side the students wrote long paragraphs filled with different information that must be separated in different paragraph. New results added by the students were detected in 32 TDs (26%), these new results were not previously mentioned in the result chapter but were added by the students in the discussion for the first time.

The result of students' interview were as following:-

- 1-Discussion chapter meaning was to compare student results with others, this was obvious in the answer of 72 (63%) students. Twenty one students (18.5%) announced that the discussion meaning is to explain the result by simpler way by using more words. The remaining of the students (18.5%) said it is a justification for the obtaining results.
- 2- All students confessed that their idea about how to write the discussion chapter was acquired from previous students.
- 3- None of the students had read any article or guidelines about how to write the discussion chapter.
- 4- None of them knew the standard guideline for writing discussion chapter.
- 5- The number of students who announced that it is not necessary for writing discussion was 17 (15%). While 11 (10%) said the discussion must be optionally written according to the need of the results. The remaining students (75%) insisted that the discussion must be written at end of each thesis.
- 6- The answer of 101 students (89%) was they wrote the discussion chapter because the previous students did. However, 13 (11%) students replied that they did that because discussion chapter is an obligatory chapter in the thesis.
- 7- The number of students who gave the third rank for the discussion chapter among other chapters was 77 (68%) after the

result and abstract chapters. While 25 (22%) students gave it the second rank after the result chapter. Whereas 6 (5%) students gave zero rank and only 6 (5%) gave the first rank to the discussion chapter.

Discussion:

This study was aimed to enlighten the contextual writing style of discussion chapter by Iraqi postgraduate students in their TDs. The results revealed that most students started their discussion text by writing long introduction or few paragraphs of literatures review or explain what they had performed in their methodology before they start directly to the result interpretation. The TDs showed that some students wrote one page to introduce or to justify their work; they did that although they had mentioned that in their introduction or literatures review in the beginning of the TDs. It is accepted that the main purpose of the project may be mentioned in the beginning of the discussion text (18) but it is not accepted that long introduction is written in the beginning. However most writing styles preferred to start the discussion by interpretation the results directly without adding any general statements before them (19, 20, 21). Furthermore, most students when they were discussing their results they reiterated writing all result that previously mentioned in result chapter and then they try to interpret them. The discussion does not need to repeat the numbers or the text of the results because the results have been well introduced in result chapter, the discussion need to mention the the final resultant followed by interpretation of them to give the meaning of these results (2, 19). Moreover the Iraqi students understand that discussion is just written to compare by other researchers findings through using the two words statements "agree with" or "disagree with" as they thought that discussion must be focused on those two statements only although some results do not need comparison. It is interesting to know that any result even it was weak must agree or disagree with others, it is axiomatic that the results either compatible or incompatible with others. The students thought that discussion basically depends on that two statements forgetting that they can use those two terms if they need that to discuss complex results which require comparison to interpret the reasons for the differences (21,22). Actually it was revealed that this is not a real discussion in these TDs, it is just to compare with others without giving the reason of disagreement or even why they agree with others. However, the students tended to use references that support them and that agree with their results even the conditions of research performing were different completely. Comparison between findings is needed but just it is a part of discussion, and it must be well explained, reasoned and give new outcome (4, 6, 21). Similar phenomenon was noticed in the TDs when the students used the statements "similar to" or "same results" to say that their results were identical to other results ignoring the differences in the methodology conditions, methods, number of cases, geographic variations, the novelty and quality of instruments, personal skill, the timing, and other factors. All these factors must influence the research findings, therefore it is not recommended to mention those

statements in that tense (19,22). The interpretation of the result needs to explain the meaning of this result first, what it refers to and what are their importance then the references can be used to support any suggestion, justification or causation. However, this study revealed that about quarter of the students used the reference in wrong pattern by inserting the findings of other researchers in the discussion regardless of the importance of these findings or even they are unrelated to their findings at all; the other findings had just bore some words used in the same discipline field of the student's result theme. It seems that the students either tried to persuade themselves that any reference can be used in the discussion as it is in the same speciality of student's project, or the students tended to make show to themselves by writing more references to make the audiences think that they had read a lot of references. Moreover, some students add those unrelated references because they need to satisfy themselves that they write well by using more references or they thought wrongly that the readers will not check the compatibility between what is in reference and what is in their discussion statements. This will lead to confuse between the researcher's findings and the findings obtained by other reference. The student must write in a way that the reader can separate easily between the research facts obtained by the researcher's own thinking and what obtained from other references (23, 24). Almost all TDs showed that the students wrote their discussion characterized by the absence of textual coherence. The readers find the sentence was not consistent with previous one as there is a barrier between them, the student jump from one statement to other without any attention to the requirement to the continuity, succession and linkage between the statements and this may lead to loose the construction and suspense of discussion (5, 25). The literatures review is considered as a reservoir to supply the references to the students to use them in the discussion as the literatures review must contain the information the project needs either directly or nearly related (22, 26). The results exhibited that all students used to use many other references that not been mentioned in their literatures review. The students thought that there is no relation between what was written in the literatures review and what they are going to write in the discussion chapter; it seems each chapter is written independently. Using one specific reference in the discussion more than three times may give an impression that the students rely on and followed that reference and neglected the other, therefore the discussion will become weak and bias. More than half of students used one reference three or more times in their discussion and some times reached to eight times as there is no reference but this one. Depending on one specific reference gives bad impression about the education and orientation of the student because this means that the discussion relies on one reference and on one idea. Any research work usually is performed from different aspects by many researchers, therefore it must be expected that many references utilize such research work with variable interpretations. Hence the discussion will be more deep and give more meaning if the student uses data from different references (26); the variation and diversification in using references are much required. Almost all students (91%) were using

different verb tenses in their discussion. They used past tense and soon jumped to use present tense although the sentence structure needs past tense. In addition they frequently made no difference between the past tense and the the past perfect tense, and this needs further more expanded studies to clarify this problem. The consistency in using verb is needed for linguistic reason and for increasing the understanding and following up by the readers (18, 25, 27, 28). Changing from one verb tense to another may mislead and make confuse to the readers that one cannot know the time of performing of the presented facts that mentioned in the discussion. Moreover, the verb tense variation may make the reader to think wrongly to the authority of a specific facts because the writing style makes the reader bewilders that this fact may belong to the student or to the another reference. Half of students tended to discuss the results they desired to show to the readers and tried to hide few results that may affect their final aims. They tried to interpret only selected findings of their results that the students possess good information about them and possess references to support their ideas, and try to ignore other results that they have no reference available to use to interpret them. On other hand they may try to hide results that bear facts do not agree with their aim or theme. It is interesting to notice that all students sometimes showed overstated attention for research limitations by presenting many excuses for the reasons of failing to obtain ideal findings. Sometimes the story did not need limitations explaining as they usually accompany any research work, or sometimes the students used wrong excuses for specific limitation that needs proper explanation (27,28,29). Every research project must face limitations that affect the final findings and conclusion (17,30). The researcher must reasonably identify these limitation, present them properly and should give proper suggestions to overtake them or minimize their impact. The surprising thing in this study that all students did not pay any attention to the hypothesis of the study, this is because they basically did not discuss or even refer to this issue. Previously (11) it was reported that most of those students did not refer to the hypothesis in the introduction chapter of their TDS. Therefore it is expected to find that all students did not mention any statement about their study hypothesis although it is so important that to confirm the performing of the aims (4, 25). The paragraphing style was not arranged correctly in all TDs as the students arranged the paragraph regardless of the need for them. The students sometimes used separated paragraph although it was directly related to the previous one as it represents completion and continuity to last the statement in the previous paragraph. Whereas in another cases it was noticed that one solid paragraph in their discussion chapter seemed to contain a lot of data needed to be separated in different paragraphs. In some TDs one can concludes the paragraphing style was arranged by the students just for decoration and beauty purpose not according to the writing style rules. Writing new paragraph means moving to another idea that must be related to the same task but not directly linked with the previous paragraph in order to let the reader to focus on another interpretation or to follow further ideas (29, 30); the new paragraph must add new idea to make advance in the main discussion for the subject.

About quarter of the postgraduate students had added new results in the discussion although these results were not formerly fixed in the result chapter. The students thought that these new results will construct further power to their results when they discussed them. Moreover, the students sometimes tended to add further results in their discussion because they imagined that these additions will give good impression by the readers to reflect their scientific ability to show that they possessed other results which can be added to the original results to increase the attitude of their findings. However the students did not realize that they must not add any new results in their discussion and they must restrict to the findings the result chapter (22, 30, 31).

The interview with students has added further not good impression about the discussion chapter writing by Iraqi postgraduate students. Most students were not able to give the real meaning of discussion process during writing the research article or TDs. They did not realize that the discussion is so necessary to give the meaning of the results and what they do aim to (5, 29). They thought it is just to explain the result in more words with simpler style or to present justification for the results they obtained through explanation the conditions that surrounding them. This was confirmed by their reply on the second question as they frankly confessed that they had no proper and scientific idea about the rules of writing the discussion text. All of them announced they tried to follow the style of discussion writing that had been used by previous graduated students. Because the later had been passed the examination which means they wrote their discussion correctly, the following students took them as a model and felt that the previous students wrote their TDs properly. Therefore, from the experience of the author of this study it can be announced that this is actually the main infliction that facing writing process in Iraqi TDs. It is so frustrating when it was found that all students announced they hadn't read any article or a study concerning discussion writing process. The student even did not spent few minutes to have some information about writing style for discussion chapter although there are free hundreds or thousands website about that. This fact confirms that the students used to inherit the writing style from previous graduated students either by direct contact or through the TDs writing style. Moreover none of those students had any idea about the guidelines that issued by the University although they might read them well and write the TDs according to them. It seems the students intended to neglect the rules of writing process and went to the easiest way for discussion writing by following the style used by previous students even it was in-

correct. However, the University rules for writing process do not explain writing process of the discussion text in details, the rules just focus on the writing structure and arrangement. This students' ignorance phenomena has lead to more serious conclusion as some of students saw that the discussion chapter is not necessary in the TDs and some thought that the discussion is better to be optional while most of them felt that the discussion might be just written in the end of the TDs regardless of its importance. Therefore most students wrote their discussion to mimic other students or it is an obligatory section that must be fixed in the end of the TDs. Usually it is expected that the discussion chapter must be considered the most important part of the TDs (4), however, the students in this study have inverted this rule and most of them gave the discussion chapter third or second rank and few of them gave zero rank. This result really is very disappointed as the students showed no attention to the importance of the discussion in their TDs. The result revealed that most students do not pay attention to the importance and philosophic aims of their discussion; they think that the results were the most important and can express the meaning without discussion. Discussion text writing problems was reported by other studies in another country as well (7). The problem is not in discussion chapter writing only but this problem was obviously detected in many TDs chapters (9,10,11,12,13,14). However, the problem of writing with other than mother language must not be excluded as a reason for poor expression, poor presentation and poor translation of the TDs writing in non-English speaking countries (8).

The results of this study revealed that the discussion main aim was missed by most students and that leads to poor discussion context. Consequently, TDs writing situation by postgraduate students are not efficient and needs an urgent revision by the authorities in order to find better solutions to make students aware of proper writing style. However the supervisors or professors need themselves to refresh their knowledge about writing process as well, the available of websites for this purpose may facilitate this task. Moreover, all Iraqi Universities must put specific courses in the curriculum of postgraduates concerning writing process to let the students in contact with this field continuously to follow the latest developments in that field.

In conclusion, the TDs writing process by Iraqi postgraduate students must be well discussed by the authorities in the Universities to evaluate the quality of this process and to put successful steps to improve the level of scientific writing style.

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كتابة الاطاريح والرسائل العلمية في حقل علوم الحياة: مشاكل كتابة فصل المناقشة

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المركز العراقي لبحوث السرطان والوراثة الطبية/ الجامعة المستنصرية

الخلاصة:

تحتوي الاطاريح والرسائل الجامعية على عدة فصول، و فصل المناقشة هو الاكثر حيوية واهمية من بينهم. تم دراسة الفصول الاخرى في تلك الاطاريح والرسائل الجامعية سابقا من حيث مشاكل الكتابة وكشفت النتائج عن وجود اخطاء جمة بعملية الكتابة في حين لا يزال فصل المناقشة لم تتم دراسته. وعليه تم دراسة وتحليل سياق الكتابة لفصل المناقشة في 124 اطروحة او رسالة جامعية لطلبة الدراسات العليا في العراق في حقل علوم الحياة لغرض التحري عن مشاكل و اخطاء الكتابة التي تواجه الطلبة. وفي نفس الوقت جرى مقابلة مع 114 طالب دراسات عليا من نفس الاختصاص لغرض الحصول على فكرة عميقة عن مدى اهتمام الطلبة بأسلوب كتابة فصل المناقشة. شملت الدراسة عدة عوامل ومعايير مستخدمة عالميا لتحليل واقع كتابة المناقشة. توصلت الدراسة الى ان معظم الطلبة لديهم فكرة متدنية او ليس لديهم اي فكرة حول عملية كتابة فصل المناقشة. تری عملية كتابة المناقشة عدة اخطاء تركيبية وعلمية. فنتبين ان الطلبة لم تكن لديهم اي معلومات عن كتابة محتوى المناقشة قبل ان يكتبوا فصل المناقشة وقاموا بالكتابة كما فعل الطلبة المتخرجين السابقين بغض النظر اذا كانت صحيحة او غير ذلك. تستنتج هذا الدراسة الى ان طلبة الدراسة العليا يكتبون اطاريحهم او رسائلهم الجامعية بأسلوب عشوائي غير ممنهج لايعتمد على اي قوانين او معايير صحيحة للكتابة مما يشير الى اهمالهم الى الاسلوب الصحيح لكتابة محتوى مناقشة صحيح. وهذا يدعو الى ان تقوم الجامعات بتقييم ذلك ووضع خطة لاعداد طلبة بمستوى يحملون الوعي الكافي للكتابة العلمية.