Dissertations at NC State University

A Guide to Understanding What Dissertations Look Like

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NC STATE UNIVERSITY

The Graduate School

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Introduction

Writing a dissertation is a major requirement for doctoral students for the completion of their degrees. It continually proves to be the most difficult part of the doctoral process, often taking several years to finish. At NC State, the average time to complete a degree for a doctoral students is 5.13 years (data from academic year 2014-2015). This is up significantly from ten years prior, when the average time to degree completion was 4.75 years.

However, there are steps that can be taken to improve doctoral students' chances of success at the dissertation stage. One important step is to be explicit about performance expectations (Lovitts, 2010). If students have a better understanding of what's expected of them in writing this document, they can be more prepared to undertake the writing they need to do.

To demystify the dissertation and create a better understanding of expectations for doctoral students, Thesis and Dissertation Support Services has analyzed hundreds of dissertations deposited at NC State. The primary goal of this report is to help doctoral students at NC State better understand the genre of the dissertation. Specifically, the results of this report will help students to see how dissertations are constructed within their general field of study to better assist them in planning their own projects.

A secondary goal for this report is to serve as a resource for NC State faculty and administrators as they advise doctoral students.

Questions about this report should be directed to the lead author, Dr. Meagan Kittle Autry, at makittle@ncsu.edu.

NC State's Definition of a Dissertation

The university's expectations for a doctoral dissertation are outlined in the Graduate Student Handbook, Section 3.7.B., which reads as follows:

> The doctoral dissertation must present the results of the student's original investigation in the field of primary interest. It must represent a contribution to knowledge, adequately supported by data, and be written in a manner consistent with the highest standards of scholarship. All dissertations must be submitted in accordance with the ETD Guide. Publication is expected and encouraged.

The Four Main Types of Dissertations

While thousands of dissertations are produced at American universities each year, you may be surprised to know that nearly all of them can be categorized into just four main types of dissertations. Research into the structures of dissertations reveal four main types (Dong, 1998; Dudley-Evans, 1999; Thompson, 1999; Paltridge, 2002): the simple traditional, the complex traditional, the topic-based, and the research article dissertation. Below, we explain these four types and provide examples of their structures to help students and faculty better understand how dissertations can be constructed. We then use this frame of classifying dissertations to analyze dissertations here at NC State.

Type 1: The Simple Traditional Dissertation

A simple traditional dissertation reports on a single large study and follows the conventional structure for research reporting, called "IMRAD."[1] This conventional structure is broken out into five chapters: Introduction, Literature Review, Materials and Methods, Results, and Discussion. Occasionally, slight variations to this structure can occur. For example, the Methods may be broken into two distinct chapters, such as "Study Conceptual Framework" and "Study Methods." Or, the Discussion may be separated into two chapters, one labeled "Discussion" and the other "Conclusion" or "Conclusions and Future Research." However, the central concept for the dissertation remains the same: the systematic reporting of a single large study.

Sample Type 1 Simple Traditional Dissertation Outline

Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: (Materials and) Methods

Chapter 4: Results

Chapter 5: Discussion (and Conclusion)

Sample Type 1 Dissertations at NC State

Tajlili, M. (2015). The future work-life balance attitudes scale: Creation of an instrument to assess millennial college women's attitudes on work-life balance. (Program: Curriculum Instruction and Counselor Education.)

Pippi, L. (2014). Social network interaction and behaviors on recreational greenways and their role in enhancing greenway potential. (Program: Design.)

Uluskan, M. (2014). Insights into the role of quality in sourcing decisions in the textile and apparel industry. (Program: Textile Technology Management.)

[1] IMRAD is an acronym derived from the first letters of the main sections of a traditional research article: Introduction, Methods, Results, and Discussion. This is the most common structure for reporting research results in the United States.

Type 2: The Complex Traditional Dissertation

As the title suggests, the complex traditional is a related but extended version of the simple traditional dissertation (Type 1). The IMRAD structure for the chapters remains the same as Type 1, but this dissertation reports on more than one study. Typically, the Introduction and Literature Review chapters may look the same as with a Type 1 Simple Traditional dissertation and the Methods chapter may offer a general description for how both studies were conducted. Then, two separate Results chapters are written, one for each of the separate studies, with a final Discussion chapter that synthesizes the work of the two studies. The Results chapters may sometimes be written in a research article format. A Type 2 dissertation is commonly written to report on case study research where there are two or three case studies.

Sample Type 2 Complex Traditional Dissertation Outline

Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: (Materials and) Methods

Chapter 4: Study 1 Results

Chapter 5: Study 2 Results

Chapter 6: Discussion (and Conclusion)

Sample Type 2 Dissertations at NC State

Alsabbagh, A. (2014). Effect of neutron irradiation on mechanical behavior of ultra-fine grained low carbon steel: Application to next generation fission reactors. (Program: Nuclear Engineering.)

Miranda Mendoza, C. (2013). Mapping visual negotiations in innovation driven team: A peek into the design process culture of graduate engineering students. (Program: Design.)

Type 3: The Topic-Based Dissertation

Type 3 is the most variant of all the dissertation types. After an introductory chapter, subsequent chapters are based on sub-topics that address the main issue (problem) of the dissertation. The chapter structures and content are highly variable. The work done in a topic-based dissertation is often, but not always, more theoretical (as opposed to the more empirical Types 1 and 2). Consequently, it is difficult to pinpoint structural or topical patterns in this type of dissertation. However, a Type 3 Topic-Based dissertation should end with a Discussion or Conclusion chapter summarizing the main points and contribution of the work to the field.

Sample Type 3 Topic-Based Dissertation Outline

Chapter 1: Introduction

Chapter 2: Topic 1

Chapter 3: Topic 2

Chapter 4: Topic 3, and so on for all middle content chapters

Chapter 5: (Discussion or) Conclusion

Sample Type 3 Topic-Based Dissertations at NC State

Ray, C. (2014). Complemented Leibniz algebras. (Program: Mathematics.)

Thompson, K. (2014). Solving nonlinear constrained optimization time delay systems with a direct transcription approach. (Program: Applied Mathematics.)

Sutko, D. (2013). The production of piracy from sea to sovereign ©. (Program: Communication, Rhetoric, and Digital Media.)

Type 4: The Research Article Dissertation

The final dissertation type reports on multiple studies and is a compilation of publishable (or already published) research articles, each of which constitutes an individual chapter. These dissertations typically have an introduction and/or conclusion to "bookend" the research articles. These chapters are important for setting the context for the studies that were conducted and for recapping the contribution the articles make collectively to the field. There may also be one or more "Literature Review" chapters that follows the Introduction and precedes the research articles.

Sample Type 4 Research Article Dissertation Outline

Chapter 1: Introduction

Chapter 2: Research Article 1

Chapter 3: Research Article 2

Chapter 4: Research Article 3, and so on for all middle chapters

Chapter 5: Conclusion

Sample Type 4 Research Article Dissertations at NC State

Furlani, R. (2015). The synthesis and biological examination of 5-membered nitrogen-based heterocycles. (Program: Chemistry.)

Bodle, J. (2014). Mechanisms of adipose stem cell differentiation from primary cilia to donor populations. (Program: Biomedical Engineering.)

Ellis, T. (2014). Mortality and movement of spotted seatrout at its northern latitudinal limits. (Program: Fish, Wildlife, and Conservation Biology.)

Gaddis, K. (2014). Improvement of dairy cattle health through the utilization of producer-recorded data and genomic methods. (Program: Animal Science and Poultry Science.)

Zheng, Yan. (2014). Demand side economics of health care provision under a single payer system: The case of Croatia. (Program: Economics.)

Other Possible Structures

Of course, there are always a few exceptions to any rule. Occasionally, a student will write a dissertation that does not neatly fit into a single one of these categories, but combines features of two or more. The reasons this may happen are highly individual and depend greatly on the type of research being conducted.

Sample Other Dissertations at NC State

Popham, L. (2014). Age differences in the regulation of subjective emotional and physiological responses to a social-evaluative stressor. (Program: Psychology.)

Nowak, W. (2014). Ultrasonic nanocoining of sub-micrometer surface features. (Program Mechanical Engineering.)

Hong, K. (2014). Improving interface usability through model transformation using interaction design models. (Program: Computer Science.)

Report Research Methods

To create a better understanding of dissertation expectations at NC State, we analyzed a large sample of for a variety of features.

Data Collection

To obtain a representative sample of dissertations, we downloaded and reviewed every dissertation deposited in the NC State Electronic Thesis and Dissertation (ETD) repository for our selected time period of one calendar year (March 28, 2014 through March 27, 2015). The total number of dissertations reviewed was 396.

Dissertations were initially categorized by college, of which there are ten at NC State. We wanted to ensure a minimum of fifteen dissertations per college. Most colleges had well beyond our minimum sample size; however, three did not: the Colleges of Design, Management, and Veterinary Medicine. To meet the minimum sample size, we retrieved the next most-recent dissertations from the ETD repository until each college had fifteen samples for analysis. It should be noted that each of these three colleges has only one doctoral program, whereas the other seven colleges have a minimum of two (Textiles) and a maximum of thirteen (Sciences) doctoral programs, thus yielding a larger sample of dissertations.

Data Analysis

Dissertations were then read and coded for a variety of features, including academic program, length in number of pages, number of chapters, and type of dissertation (see above literature review for explanation of dissertation types). We calculated mean and mode statistics for all categories at the college-level and for a few notable categories at the program-level. Example dissertations to demonstrate specific findings were chosen randomly for inclusion in this report.

Data Availability

Our data set is openly available as an Excel file on the Thesis and Dissertation Support Services website: go.ncsu.edu/tdss.

Results: What Dissertations Look Like at NC State

Of the 396 dissertations that were reviewed, 31 percent (124) came from the College of Engineering. The College of Sciences followed the College of Engineering with nearly 21 percent (82) dissertations. Figure 1 shows the complete distribution of sampled dissertations by college.

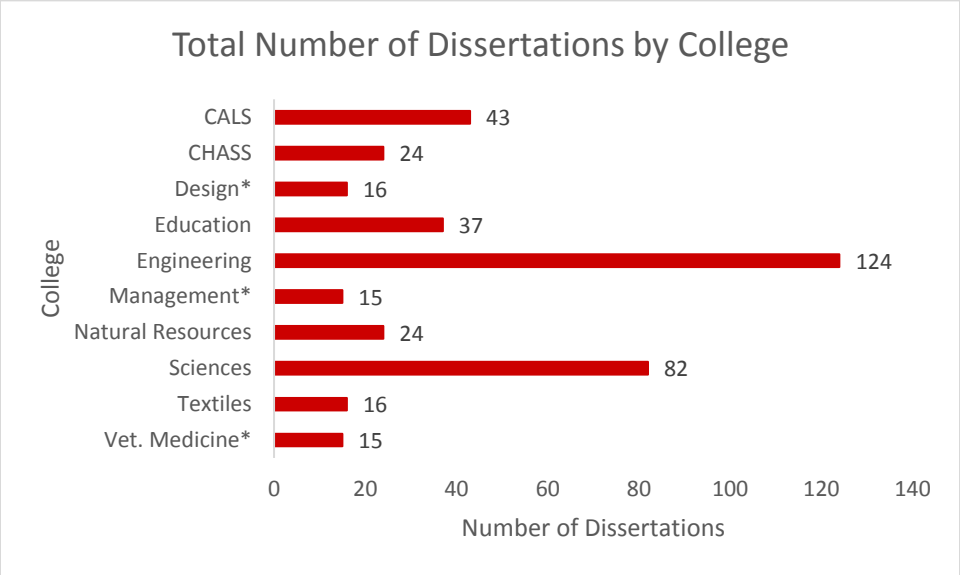

*Figure 1: Distribution of dissertations by college. * indicates only one doctoral program in these colleges.*

Dissertation Types

Dissertations were coded for type of dissertation (Type 1 simple traditional, Type 2 complex traditional, Type 3 topic-based, or Type 4 research articles) within each of the ten colleges (see above literature review for explanation of dissertation types). As shown below in Figure 2, the Type 4 dissertation, research articles, was by far the most common type of dissertation at NC State. Nearly 65 percent (256) of dissertations were categorized as this type. Of the ten colleges, only two (Design and Education) did not have any research article dissertations, while 100 percent (15) of the College of Veterinary Medicine's dissertations in our sample were research articles.

Following the research article dissertation, the Type 1 simple traditional dissertation was the second most common dissertation type in our sample. Of the 396 dissertations in this sample, roughly 20 percent (80) were categorized as simple traditional. Of the ten colleges, only one (College of Veterinary Medicine) did not contain any simple traditional dissertations, while 100 percent (37) of the projects from the College of Education were simple traditional. Within the College of Education and the College of Design there were some variations of what the simple traditional dissertation looked like (see College of Education and College of Design sections below for more).

Topic-based dissertations were the third-most popular type of dissertation in our sample. Nine percent (36) dissertations were topic-based. The College of Sciences had the most topic-based dissertations of any program with 28 percent (23 dissertations out of a total

of 36 topic-based dissertations for the entire report), which were primarily clustered in two doctoral programs: Engineering (11) and Sciences (23). See the College of Sciences section below for more analysis.

The final type, Type 2 complex traditional dissertation, was not common in our sample. Only about 4 percent (14) of the dissertations were categorized as complex traditional, and only 3 of the ten colleges (Humanities and Social Sciences with 2 dissertations (8%), Design with 4 dissertations (25%), and Engineering with 8 dissertations (6 %)) had students who wrote complex traditional dissertations.

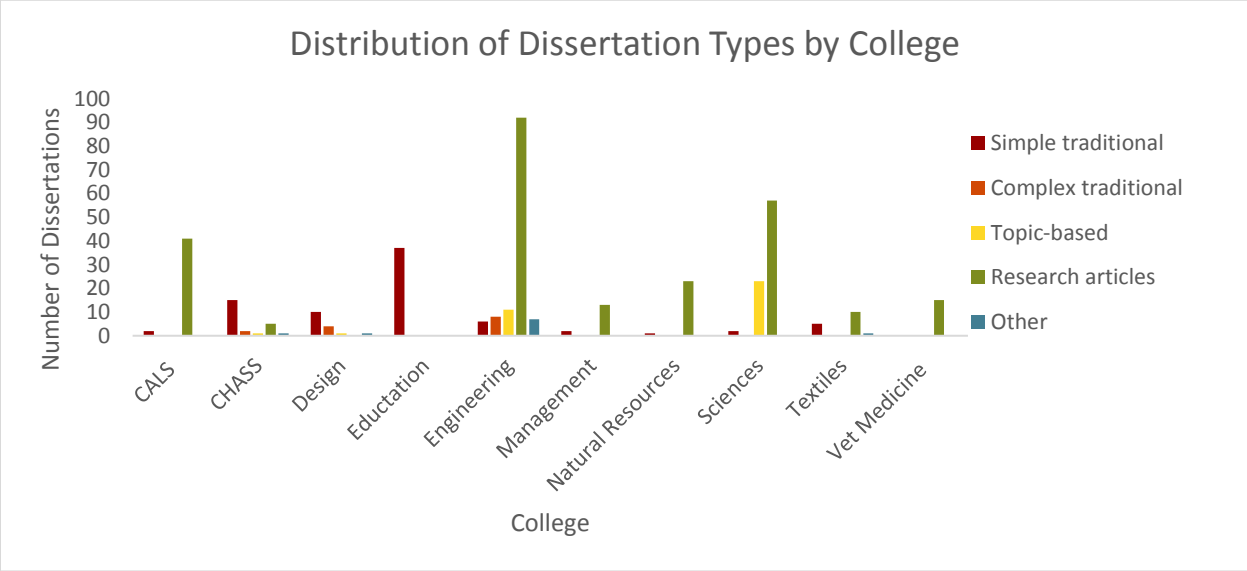

Figure 2: Distribution of the types of dissertations by college.

Type Uniformity

Two of the ten colleges had 100 percent uniformity in type of dissertation. The College of Education's 37 dissertations in our sample were all Type 1, simple traditional, and the College of Veterinary Medicine's 15 dissertations were all Type 4, research articles. As shown in Figure 3, the College of Agriculture and Life Science (CALS), the College of Natural Resources, and the Poole College of Management all had near uniformity (at least 86%).

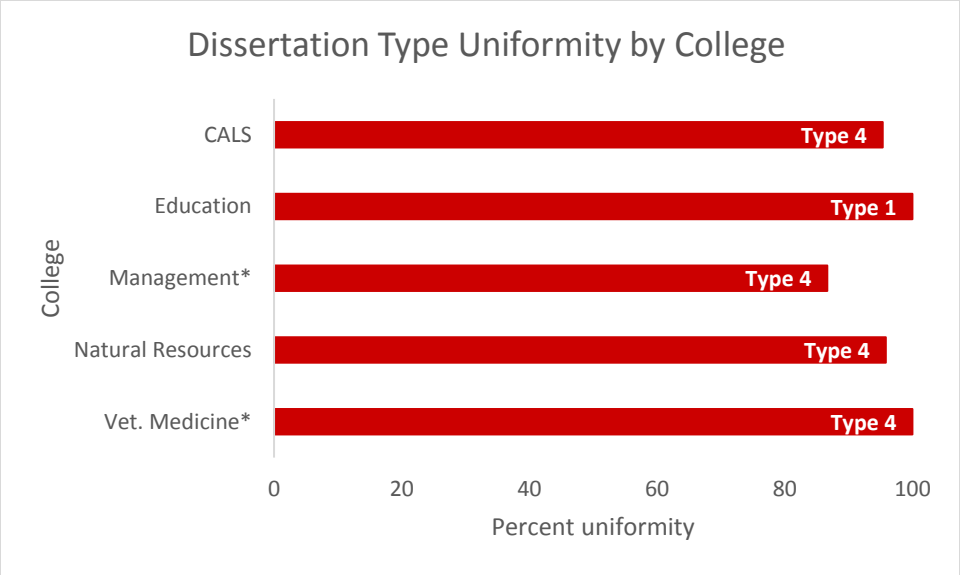

*Figure 3: Dissertation type uniformity by college. * indicates only one doctoral program in these colleges.*

Dissertation Lengths

In addition to coding for the type of dissertation, we coded for length of the entire dissertation file, length of the dissertation text, length of the introduction, and length of the conclusion. Figure 4 below shows the average dissertation text length by college. The averages ranged from a low-end of 119 pages (Humanities and Social Sciences) to a high-end of 215 pages (Design) of dissertation text. This number does not include the dedication, table of contents, appendix, references (again, unless the references are included within each chapter of the text, as is the case with research articles) or any other front or back matter. Page length does include the Introduction (if one is present) to the conclusion (if one is present).

The dissertation text lengths ranged from a very brief 23 pages (Aerospace Engineering) to 1,022 pages (Civil Engineering), yielding a text length range of nearly 1,000 pages. Not all colleges had this great of a range. The College of Engineering had both the dissertation with the fewest and the dissertation with the most pages. The Poole College of Management dissertations were the most consistent in length, having the smallest page range of all of the colleges; this consistency is likely because the college has only one doctoral program. Students' projects varied between 72 pages to 184 pages, for a range of just 112 pages. For more information on the distribution and range of dissertation text length within each college, see the appropriate college section(s) below.

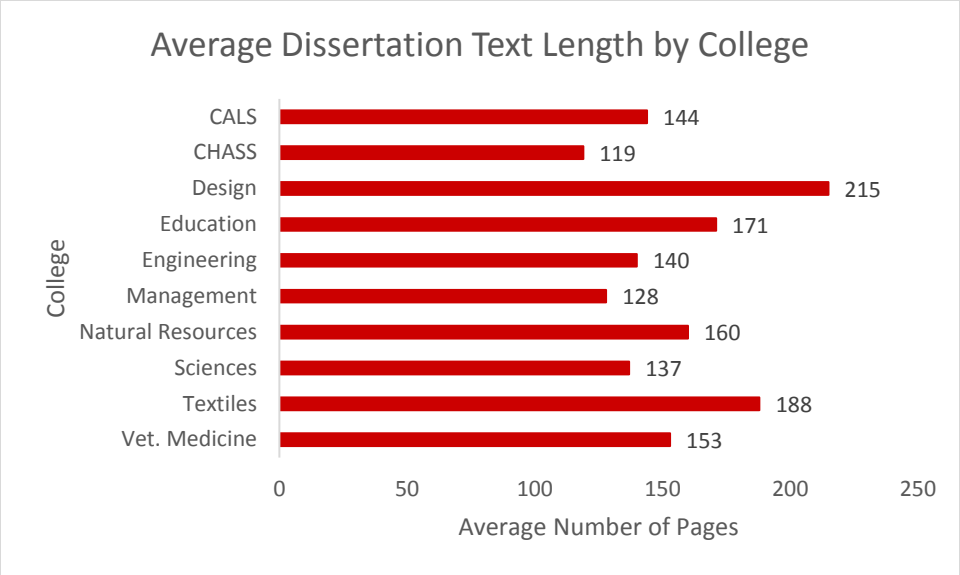

Figure 4: Average dissertation length (in pages) by college.

The average number of chapters by college can be seen in Figure 5. The Poole College of Management had the lowest average with 4.2 chapters, while the College of Design had the highest average, 7.3 chapters. The College of Design also had the dissertation with the most chapters (14). The Poole College of Management, the College of Sciences, and the College of Humanities and Social Sciences all had at least one dissertation with only two chapters. The College of Education was the most consistent in the number of chapters for each dissertation. All Education dissertations contained either five (31 dissertations) or six (6 dissertations) chapters. For more information about the number of chapters within each college and/or program, see the appropriate sections(s) below.

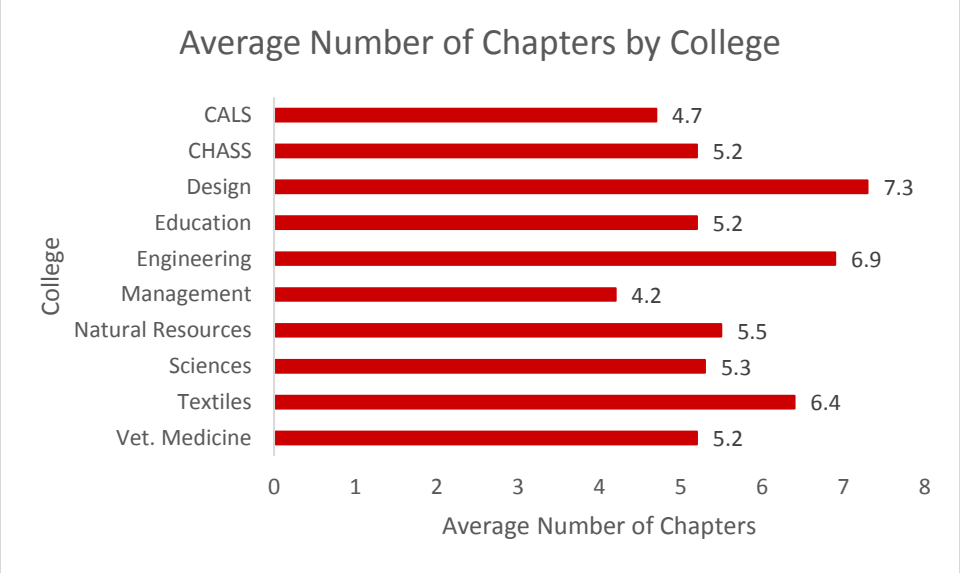

Figure 5: Average number of chapters in a dissertation by college.

Dissertation Introductions and Conclusions

While collecting the data for this report, we found that a large number of the dissertations in our sample did not have a strictly-dedicated introduction and/or a conclusion. Out of the ten colleges, none had 100 percent of the dissertations containing both an introduction and or/ a conclusion. The College of Education came closest with 97.5 percent (36) of the dissertations containing an introduction and 97.5 percent (36) containing a conclusion (which they generally label Discussion). Figure 6 shows the average page length of the introduction and conclusion by college. The dissertations without an introduction and/or conclusion were excluded when calculating the averages shown in this figure.

When present, average introduction chapter lengths range from 5.9 pages (Poole College of Management) to 18.6 pages (College of Agricultural and Life Sciences). Average conclusion chapter lengths range from 4.59 pages (College of Engineering) to 24.95 pages (College of Education). Within each college there was variation of what content was included in the conclusion section. Some conclusions were a combination of a conclusion and a discussion, others were conclusion and future research, and some were traditional conclusions.

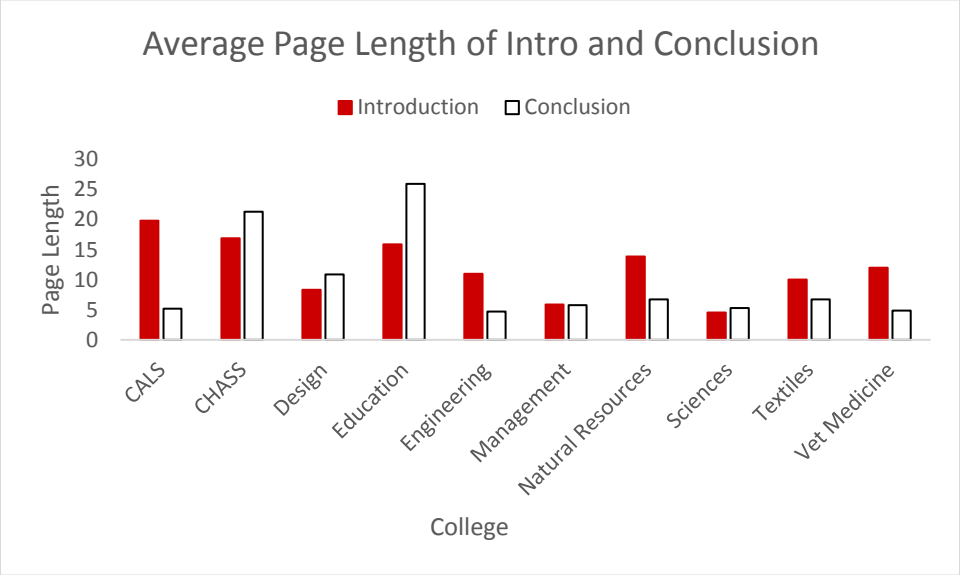

Figure 6: Average page length of introduction and conclusion by college.

In what follows, we report our analysis of dissertations from each of the ten colleges at NC State.

College of Agricultural and Life Sciences

Our sample contained 43 dissertations from the College of Agricultural and Life Sciences (CALS), representing twelve of their doctoral programs.[2] Nearly every dissertation was a research article dissertation (Type 4; see Table 1). The exceptions were the Agricultural and Extension Education program, where students wrote the typical Type 1, simple traditional, dissertation seen in education fields, and the Biological and Agricultural Engineering program.

The mean number of chapters was 4.7, and the mode was 5 chapters. The average length of the dissertation text was 144.3 pages, with a range from 57 to 323 pages. It was common for Chapter 1 to be titled "Literature Review," rather than "Introduction," with the following chapters being the research articles. This was most frequently seen in the Animal Science and Poultry Science program. Only 49 percent (21) dissertations included a Conclusion chapter, which averaged approximately five pages long when present.

It is not surprising to see such a high percentage of research article dissertations for these fields, for two key reasons: in CALS, submission of graduate student work for publication is either required by the program (e.g. Nutrition) or expected/encouraged (e.g. Crop Science). If students are encouraged to be publishing work, then it makes sense for the final doctoral product to align with both programmatic encouragement and work that would benefit them professionally.

Table 1: Breakdown of Dissertation Types in CALS

Type of Dissertation	Number of Dissertations
1 (Simple traditional)	2
2 (Complex traditional)	0
3 (Topic-based)	0
4 (Research articles)	41

College of Humanities and Social Sciences

We analyzed 24 dissertations from the College of Humanities and Social Sciences, which came from their four doctoral programs.[3] As shown in Table 2, this college has more variation than any other college in the distribution of types, even within individual programs. The most consistent program was Psychology, with mostly Type 1 dissertations, though the program now includes research article dissertations (Type 4) as an acceptable dissertation format. The mean number of chapters for this college was 5.2, and the mode was 5 as well. The average length of the dissertation text was 119 pages, with a range from 25 to 234 pages. Psychology dissertations tended to be the shortest,

[2] For the purposes of this study, the jointly-administered Biological and Agricultural Engineering program's dissertations were counted under CALS and not Engineering.
[3] The college now has a fifth PhD in Public History, whose first cohort began their first year during our period of data collection.

averaging 78 pages (total range from 25 to 179). All but three dissertations from Humanities and Social Sciences included an Introduction chapter, which averaged nearly 17 pages long. Of the dissertations from this college, eleven (46%) did not contain a conclusion. Of the thirteen dissertations with a conclusion, the average length was twenty one pages. Two conclusions (both in Psychology) had a one page conclusion, while the longest conclusion (Communication, Rhetoric, and Digital Media) was 82 pages. Other than these three extremes, conclusions were usually between 7 and 25 pages long.

Table 2: Breakdown of dissertation types in Humanities and Social Sciences

Type of Dissertation	Number of Dissertations
1 (Simple traditional)	15
2 (Complex traditional)	2
3 (Topic-based)	1
4 (Research articles)	5
Other	1

College of Design

There were 16 dissertations from the College of Design, which consists of a single doctoral program with seven main research interest areas. The most common dissertation type was Type 1, the simple traditional dissertation, though all types were represented in this sample (see Table 3). Design dissertations tend to be quite long: the average number of chapters is 7.3, with the mode being 7 (5 dissertations) and 8 (5 dissertations) chapters, and the average dissertation length 215 pages. The shortest was 115 pages; the longest, 581.

Table 3: Breakdown of dissertation types in Design

Type of Dissertation	Number of Dissertations
1 (Simple traditional)	10
2 (Complex traditional)	4
3 (Topic-based)	1
4 (Research articles)	1
Other	0

Most notably about Design dissertations is that they fit a more “extended” version of the simple traditional dissertation. Rather than having the typical five-chapter IMRAD model, extended simple traditional dissertations often take multiple chapters to report methodological approaches, methods, statistical analysis, modeling, and more. Quite frequently, an extended simply traditional dissertation results from a mixed-methods

approach that uses both qualitative and quantitative research to answer the research problem. This type of dissertation is different than the Type 2, complex traditional, because the Type 2 dissertation reports on multiple closely-related studies, whereas an extended Type 1 uses multiple middle chapters to report on a mixed methods approach for a single study.

Sample Extended Type 1 Dissertations in the College of Design

Monsur, M. (2014). Does Child Care Architecture Matter? Investigating how Indoor-Outdoor Spatial Relations Influence Child Engagement and Teacher Motivation. (Program: Design.)

Ghobad, L. (2013). Analysis of Daylighting Performance and Energy Savings in Roof Daylighting Systems. (Program: Design.)

College of Education

We analyzed a sample of 37 dissertations from the College of Education, which had remarkable uniformity in the type of dissertation written by doctoral students in their programs. Every dissertation in the sample was a Type 1, simple traditional dissertation (see Table 4). Education dissertations average 5.2 chapters, with the mode number of chapters also being 5. Dissertations with six chapters frequently separated the final chapter, "Discussion," into two separate ones, titled "Discussion" and "Conclusion" or "Conclusion and Implications." Regardless how titled, these dissertations all had the same content, but the writers just divided up that content differently. Because of the nature of a Type 1 dissertation, the College of Education had the highest percentage of dissertations that included both an Introduction and Discussion/Conclusion chapter (97.3%). The average College of Education dissertation is 170.9 pages long, with a range from 85 to 361 pages in length.

Table 4: Breakdown of dissertation types in Education

Type of Dissertation	Number of Dissertations
1 (Simple traditional)	37
2 (Complex traditional)	0
3 (Topic-based)	0
4 (Research articles)	0

College of Engineering

There were 124 dissertations from the College of Engineering, coming from all of their twelve doctoral programs. Engineering programs see more variety in the type of dissertation written by their students, though the dominant form is still the Type 4 research article (see Table 5). A few programs had strong uniformity in the type of

dissertation written by students in that field, including Aerospace Engineering, Biomedical Engineering, Chemical Engineering, Electrical Engineering, and Material Science and Engineering (see Figure 7). Engineering dissertations had the second-highest average number of chapters, at 6.85; the mode number of chapter was seven. The average dissertation was 140.3 pages, with a range from as few as 23 pages (Aerospace Engineering) to a whopping 1,022 (Civil Engineering).

Table 5: Breakdown of dissertation types in Engineering

Type of Dissertation	Number of Dissertations
1 (Simple traditional)	6
2 (Complex traditional)	8
3 (Topic-based)	11
4 (Research articles)	92
Other	7

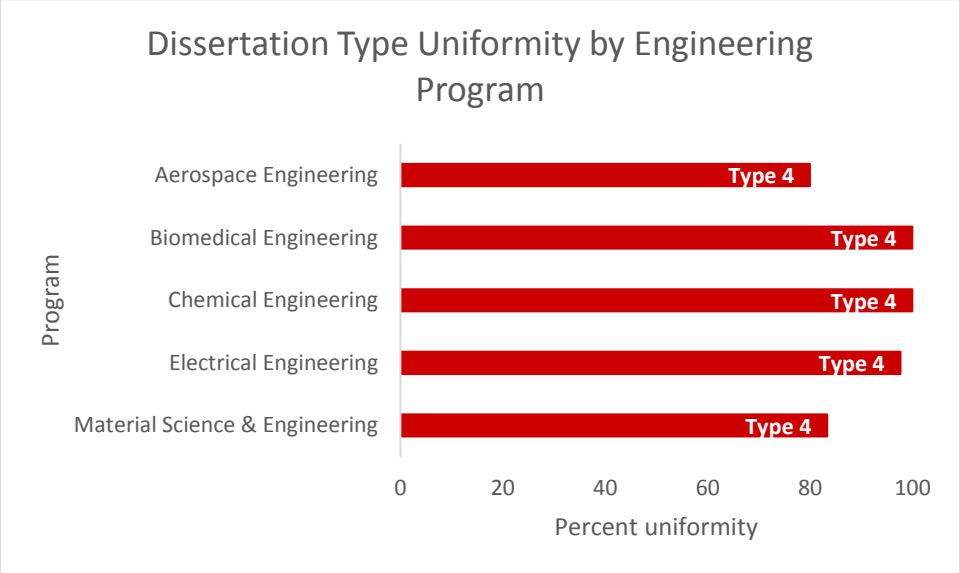

Figure 7: Dissertation type uniformity within engineering programs

In Engineering, we saw a wide range of extremes with dissertation length. First, Aerospace Engineering had the shortest dissertation (23 pages) of all dissertations in our sample. Of the five Aerospace Engineering dissertations, this was the only simple traditional (Type 1) dissertation. The remaining four dissertations were research articles. The lengths of the research article dissertations in this program ranged from 94 pages to 183 pages. This short, Type 1 example is likely an outlier, and the longer research article

examples are likely more representative of work completed within Aerospace Engineering.

By contrast, Civil Engineering had the longest dissertation (1,022 pages) in our sample. This dissertation is categorized as "other." It contained 12 chapters, which, surprisingly, wasn't the highest number of chapters for an Engineering dissertation. (A dissertation categorized as "other" from Computer Science was 127 pages long with 13 chapters.) There were 18 Civil engineering dissertations, of which two-thirds were research articles. Excluding the 1,022 page dissertation, civil engineering dissertations ranged from 75 pages to 247 pages.

Excluding the 23 page dissertation and the 1,022 page dissertation, engineering dissertations ranged from 53 pages (Computer Engineering) to 248 pages (Industrial Engineering). Without these two extremes, the average page length of engineering dissertations would be 134 pages. It is clear that neither the 23 nor the 1,022 page dissertation is typical of engineering dissertations.

Poole College of Management

We sampled 15 dissertations from the Poole College of Management, which all came from their single doctoral program, Economics. The majority of Economics dissertations (87%) are the Type 4 research article dissertation. Notably, this discipline frequently uses the term "essays" to refer to their research articles, and this term featured prominently in titles of the dissertations. For example, one dissertation was titled, "Three Essays in Spatial Economics." These dissertations had an average of 4.2 chapters, and the mode number of chapters was five. Two-thirds of the dissertations had a first "Introduction" chapter, which averaged slightly fewer than six pages. The average length of Economics dissertations was 127.5 pages, with a range from 72 to 184 pages. Interestingly, all of the four shortest dissertations from this program (72 pages, 78 pages, 82 pages, and 83 pages) did not have an introduction or a conclusion. By contrast, the two longest dissertations (184 pages and 183 pages) did have an introduction and a conclusion.

Table 6: Distribution of dissertation types in Economics

Type of Dissertation	Number of Dissertations
1 (Simple traditional)	2
2 (Complex traditional)	0
3 (Topic-based)	0
4 (Research articles)	13

College of Natural Resources

A total of 24 dissertations were sampled from the College of Natural Resources (CNR), representing its four doctoral programs.[4] All but one of the dissertations was a Type 4, research article dissertation (see Table 7). CNR dissertations had an average of 5.5 chapters, with the mode number of chapters being 5. The average length of a CNR dissertation was 160.3 pages, with length ranging from 68 to 368 pages. The average length of the introduction was 13.9 pages. Only 16 of the 24 (66.7 percent) dissertations had an introduction. The average length of the conclusion was 6.7 pages, with 17 of the 24 (79.8 percent) dissertations had a conclusion.

Table 7: Distribution of dissertation types in CNR

Type of Dissertation	Number of Dissertations
1 (Simple traditional)	1
2 (Complex traditional)	0
3 (Topic-based)	0
4 (Research articles)	23

College of Sciences

The second highest number of dissertations came from the recently-formed College of Sciences, with 82 dissertations from its thirteen doctoral programs. Again, the research article dissertation represents a majority of the dissertations completed within this college (70%), but a notable number of dissertations (23) were Type 3, topic-based (see Table 8). Most of the Type 3 dissertations came from the Applied Mathematics, Mathematics, and Statistics programs.

Dissertations from this college averaged 5.3 chapters, with the mode number being five. The average dissertation length was 137.3 pages, with the lengths ranging from 40 to 451 pages. The Mathematics program had the lowest average length, with only 77.7 pages. Overall, the College of Sciences had the lowest percentage of dissertations with a conclusion (45%) and was the median for percentage of dissertations with an introduction (85%).

Table 8: Distribution of dissertation types in Sciences

Type of Dissertation	Number of Dissertations
1 (Simple traditional)	2

[4] The college jointly administers the Ph.D. in Fisheries, Wildlife and Conservation Biology with departments in CALS and CVM; for the purposes of this report, the degree program is categorized under the College of Natural Resources.

2 (Complex traditional)	0
3 (Topic-based)	23
4 (Research articles)	57

College of Textiles

We reviewed 16 dissertations from the College of Textiles' two doctoral programs. The type of dissertation written by students in this college follows a clear programmatic pattern: 10 of 12 (83.3%) dissertations from Fiber and Polymer Science were research articles (Type 4; see Table 9), and three of the four from Textile Technology Management were simple traditional dissertations (Type 1; see Table 9). Dissertations from this college averaged 6.4 chapters, with the mode number of chapters being five. The average length of a dissertation was nearly 188 pages; while most dissertations ranged from 92-200 pages, a few outliers (eg. 326 and 402) helped to raise the average length to the top of that range.

Table 9: Distribution of dissertation types in Textiles

Type of Dissertation	Number of Dissertations
1 (Simple traditional)	5
2 (Complex traditional)	0
3 (Topic-based)	0
4 (Research articles)	10
Other	1

College of Veterinary Medicine

There were 15 sample dissertations from our tenth and final college, the College of Veterinary Medicine (CVM). To obtain this minimum sample number, dissertations reviewed from this college came from as far back as February 2013. On average, the full CVM dissertation is 153.1 pages long, with a range from 85 to 247 pages. Every single dissertation from CVM's one dissertation-producing doctoral program, Comparative Biomedical Sciences, was a Type 4 research article dissertation (see Table 10). Dissertations had an average of 5.2 chapters, with the mode number being 4 and 5 chapters. Notably, only three dissertations (20%) had a formal "Introduction" chapter as their first chapter, which was the lowest percentage of all colleges. It was more common for a chapter preceding the research articles to be a Literature Review chapter instead (6 dissertations). Eight dissertations had a conclusion chapter to wrap-up the project though they averaged less than five pages in length. Only two dissertations (13%) from this college contained both a formal introduction and conclusion. Six of the fifteen dissertations (40%) did not contain either a formal introduction or conclusion.

Table 10: Distribution of dissertations in CVM

Type of Dissertation	Number of Dissertations
1 (Simple traditional)	0
2 (Complex traditional)	0
3 (Topic-based)	0
4 (Research articles)	15

Conclusion

Key Trends for Dissertations at NC State

From our study of 396 dissertations deposited at NC State, we can identify some important trends for students and faculty that help to demystify the planning and writing process of this genre.

Trend 1: Patterns

Primarily, this study demonstrates that there are clear patterns within doctoral programs and disciplines. We have identified many of these patterns in the previous section of the report. For example, most dissertations from the College of Sciences are Type 4 research article ones, except for Mathematics and Applied Mathematics students' projects, which are almost consistently Type 3 topic-based dissertations. College of Veterinary Medicine students all write Type 4 research article dissertations, whereas a College of Education student is most likely writing a Type 1 simple traditional dissertation.

Having discernable patterns within disciplines is good news for students. This means that students should be able to retrieve a set sample dissertations completed by previous students in their program from the ETD repository and be able to discern important context clues about writing their own dissertation from a sample. In writing studies, we know that examining sample texts is a great way to learn about writing a new genre. In studying previous examples of dissertations, students can get preliminary answers about expectations within their programs and discipline. Identifying patterns can also give students clear language for discussing expectations with their advisors and committee members.

Trend 2: Preference for the Research Article Dissertation

This study reveals that the most popular type of dissertation at NC State is the research article dissertation (64.6%). It is the most likely candidate of dissertation type for seven of our ten colleges. We see this as a positive development in doctoral research; for students pursuing academic jobs, they are aligning their educational pursuits with their future professional requirements. Writing research articles also contributes to the research productivity of the university.

We expect this trend to continue and for the percentage of Type 4 dissertations to increase over time. Primarily, we expect this because doctoral programs that have not

traditionally seen students write research articles for their dissertation are now encouraging this form (eg. Psychology and Educational Leadership, Policy, and Human Development).

Trend 3: Variation in Including Introduction and Conclusion Chapters

Within the common Type 4 Research Article dissertation, students still have some flexibility with chapter structure. We found wide variations in the types of chapters that accompanied the research articles. Some included introductions, but many did not; some included literature reviews, but many did not; and few included conclusions, but most did not. The challenge with this wide variation, and primarily with the lack of many of these three potential accompanying chapters, is that without them, a research article dissertation sometimes does not read as a cohesive work. Without an introduction, it can be unclear what larger problem in the field the study is addressing. Furthermore, without a conclusion, the original contribution that the project collectively makes to the literature is left implicit, when it is critical for the student to demonstrate explicitly what this contribution is. We encourage both students and faculty to incorporate these important contextual chapters.

Final Note

Students must remember that every iteration of a dissertation is a uniquely negotiated document between the doctoral candidate and committee members, and that variations do occur at the most local level depending on their project, advisor, other committee members, and other circumstances. Doctoral programs can also have sets of expectations that influence the development of a dissertation project, such as a requirement for submitting a chapter for publication.

However, even though each dissertation is unique, the information in this report provides students with a helpful guideline for thinking about their own dissertation and understanding certain expectations that exist within their fields and programs. This information is invaluable for helping them get started off on the right foot.

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Additional Resources on Scholarly Research Writing

Books

Belcher, W. L. (2009). *Writing your journal article in twelve weeks: A guide to academic publishing success*. Sage.

Booth, W. C., Colomb, G. G., & Williams, J. M. (2003). *The craft of research*. University of Chicago press.

Silvia, P. J. (2007). *How to write a lot: A practical guide to productive academic writing*. American Psychological Association.

Swales, J. M., & Feak, C. B. (2004). *Academic writing for graduate students: Essential tasks and skills* (Vol. 1). Ann Arbor, MI: University of Michigan Press.

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Websites

Patter (blog) by Pat Thomson
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Pat Thomson is a professor of Education in the School of Education at The University of Nottingham. Thomson researches and writes about the writing that scholars want to do and must do during their graduate and professional careers. This blog features articles about literature reviews, dealing with conference abstract reviewers, finding a mentor, choosing writing partners, recruiting participants for research, and more.

Inside Higher Ed Grad Hacker (blog)
https://www.insidehighered.com/blogs/gradhacker/gradhacker-rescue

Graduate, doctoral, and post-doctoral students from universities around the world contribute to this blog, giving advice and sharing stories with their peers. From exercises, writing tips and tricks, time management advice, general support, encouragement, and a few personal anecdotes, Grad Hacker has a lot of resources that graduate students can use to help them through the writing process.

Academic Coaching and Writing
http://www.academiccoachingandwriting.org/

Academic Coaching and Writing supports graduate students, postdoctoral candidates, faculty, staff, and administrators to advance toward their academic goals. ACW is led by a team of professional academic coaches and consultants. This website offers several articles, webinars, workshops, and consultations. Past webinars have included topics

such as publishing your dissertation research, managing the imposter syndrome in academia, writing a journal article, developing your academic support network, and conducting an academic job search. These webinars are usually free and available multiple days and times.

Explorations of Style (blog) by Rachael Cayley
https://explorationsofstyle.com/

This blog offers an ongoing discussion of academic writing and its challenges. The author discusses strategies to improve the writing process and the process of conveying new research in writing. Author, Rachael Cayley, is also present on Twitter, where she shares links that are connected to academic writing, the state of academic publishing, technological shifts that impact academic texts, among others.