

MSE Thesis Information & Requirements

updated Spring 2009

Note: The thesis proposal meeting (III-3) and final meeting (VI-4) portions of this document go into effect with students beginning their thesis in the Fall of 2009.

I. OVERVIEW

The Master of Science Education (MSE) program at Lebanon Valley College (LVC) provides students with a variety of learning experiences aimed at developing scientific inquiry skills that can be passed on to their own elementary-, middle-, or high-school students. Such a process mandates that students (at all levels) learn in a hands-on manner, and the pinnacle of such an approach involves students' own empirical research. Educational institutions (at the undergraduate and graduate level) have long-established traditions of having students demonstrate their mastery of the research process (as well as their competence to work in an independent manner)¹ by completing written reports of their work; here at LVC, this is accomplished by having students complete a Master's Thesis as the final step in the MSE program.

Engaging in thesis research allows students to learn more about a topic they are curious about, but also contemplate (and potentially solve) real-world educational problems. It may also provide opportunities for higher income or professional advancement, as the organizational, technical, and intellectual skills acquired as part of the research process are in high demand in a variety of professional settings.

There is no doubt that completing a thesis requires hard work. However, MSE students have not proceeded to graduate-level training without already completing complex educational tasks, and as teachers themselves, they require disciplined study from their own students. Such work requires successful teacher-student interactions, and the MSE program provides students with advisors that have research-based expertise in a variety of fields related to science education. These individuals work closely with students at all steps of the thesis process (see below for details), including the initial conceptualization of their projects, carrying out data collection and analysis, meeting with each student's Thesis Committee, and preparing the final Thesis document itself. This mentor-based process fosters a learning environment that transforms a challenging task into a positive educational experience that students will take pride in completing.

Furthermore, while completing a thesis satisfies a graduation requirement for the MSE program, on a more important level it also provides students with inquiry-based tools that can be exported back to their own classrooms, challenging their own students to carry out investigations according to standards established by the larger scientific community. Research is viewed by many individuals as the ultimate learning experience, and as educators themselves, MSE students will not only experience this first-hand, but will be able to pass such valuable knowledge on to their students. The hands-on and critical thinking skills accompanying the research process are vital in a world dominated by ever-changing technology, and having the skills to adapt to such an environment will benefit all MSE program graduates, as well as their own students, for a lifetime.

¹This idea, as well as others within this Overview, is adapted from Cone, J.D. & Foster, S.L. (2006). *Dissertations and theses from start to finish: Psychology and related fields*. Washington, DC: American Psychological Association.

II. THESIS PREPARATION

1. Students must earn a passing grade (grades A-C) in MSE 829 (Research Methods; 3 credits) before beginning work on their MSE thesis.
2. Students MUST meet with the MSE Coordinator to assemble a Thesis Committee (see section III). Once the committee is formed, students will meet with their Thesis Advisor to discuss their project and then schedule a proposal meeting with their Thesis Committee (see section III).
3. Once the committee is approved by the MSE Coordinator, the advisor has agreed to the project, and the proposal meeting is scheduled, students must enroll in MSE 830 (Thesis Preparation).
 - a. This course is taken when students are ready to propose their research project, research the literature on their thesis topic, and engage in data collection/analysis for their thesis.

III. THESIS COMMITTEE, PROPOSAL MEETING, & ADVISING ISSUES

1. The composition of a given Thesis Committee is subject to the approval of the MSE Advisory Committee. A student must be prepared (if asked) to provide the MSE Coordinator with a brief description of the credentials of each committee member (e.g., educational background, current position) as well as a short letter/E-mail noting the willingness of the individual to serve on the Thesis Committee. With these ideas in mind, a Thesis Committee must consist of at least 3 members, with the following makeup:
 - a. a thesis advisor (Committee Chair; LVC faculty or outside professional)
 - b. the MSE Program Coordinator and/or the Director of Graduate Studies & Continuing Education
 - c. an additional reader (if necessary), who may be either an LVC faculty member or outside professional
2. The Thesis Advisor will oversee the development and quality of the research question, research design (i.e., data collection procedure), and analysis plan before it is presented to the Thesis Committee for official approval. The Thesis Committee may require changes to the question, design, and/or analysis plan at the proposal meeting.
3. Once the Thesis Advisor approves a student's initial research question, research design, and analysis plan, the student will schedule a meeting with all Thesis Committee members. At the committee meeting, the student will present an empirically supported *rationale* for the project. The student should also describe *a step-by-step procedure*, a brief outline of the *type of analyses* that will be used, and *make specific predictions* about the outcome of the project. The student should also be prepared to *address questions* that the committee may raise about the rationale, design, analysis, and hypothesis. Immediately following the student's presentation, the Thesis Committee (without the student's presence) will discuss the proposal and either (a) approve the proposed project, (b) require changes or additions to the proposed project, or (c) reject the proposed project. The Thesis Committee will then immediately inform the student of their decision.
4. Once the project is approved by the Thesis Committee, the student (assisted by their advisor) must prepare and submit a research proposal to LVC's Institutional Review Board (IRB). This committee reviews all College-sanctioned research involving human subjects, and THEY MUST APPROVE STUDENTS' PROJECTS PRIOR TO ANY DATA BEING COLLECTED FOR THESIS RESEARCH.
5. Once a student's project has been approved by the IRB, the thesis advisor will:
 - a. provide regular checks on the progress of the student; at a minimum they will review the progress of the student so that they can make an appropriate grade assignment for MSE 830.
 - b. ensure that the research project approved by the Thesis Committee at the proposal meeting is carried out as planned. Dramatic changes to the question, design, or analysis require approval by the other members of the Thesis Committee.
 - c. agree upon a completion schedule for the project and thesis.
 - d. at an appropriate time, review a complete draft of the thesis document.
 - e. upon approval of the thesis document, forward the approved draft to the Thesis Committee for its final approval.

IV. THESIS RESEARCH OPTIONS

There are a variety of approaches that can be taken regarding one's Master's Thesis Research, but the common thread of these approaches is that they involve the collection and analysis of quantitative and/or qualitative data. General topics should focus on (but are not necessarily limited to) the following research domains:

1. surveying teacher/student characteristics
2. evaluating student-, class-, or curriculum-based assessment techniques
3. assessing the validity/effectiveness of educational policies
4. exploring the effectiveness of innovative classroom activities
5. implementing basic or applied laboratory methods concerning teaching/learning approaches

Students should consult science education journals (e.g., *Journal of Research in Science Teaching*, *Journal of High School Science Teaching*, *Teaching of Psychology*, *Journal of Chemistry Education*, etc.) for examples of specific applications of these (and other, related) science education research methodologies. Furthermore, prior to beginning one's research, students must have their project approved by their Thesis Committee.

V. THESIS ELEMENTS

Regardless of the approach that one takes in conducting their Master's Thesis Research, the actual thesis must contain the following elements, appearing in the order presented below. Furthermore, theses must adhere to the scientific format known as APA (American Psychological Association) style; the technicalities of this writing approach are delineated in the *"Publication Manual of the American Psychological Association"* (2001, 5th Edition; published by the American Psychological Association; ISBN 1557988102). Cone & Foster's (2006, 2nd Edition) *"Dissertations from Start to Finish"* (published by the American Psychological Association; ISBN 9781591473626) also offers detailed guidelines on the nuances of APA style.

Each of the following sections should begin on a new page, with all of the primary portions of the thesis (elements 5-15) double-spaced. Text should be presented in 12-point font, with 1-inch margins on each page. Page numbers should appear in the upper right corner of each page, starting with the Title Page. Furthermore the collective length of the primary portions of the thesis (i.e., Introduction, Method, Results, & Discussion) MUST be at least 20 complete pages. Examples of Elements 1-4 are attached to this document as an Appendix, while journal articles and the texts mentioned above should be consulted for examples of Elements 5-15.

1. Title Page
 - a. include the thesis title, your name, program name, and month & year of graduation
2. Table of Contents
 - a. include all sections from "Thesis Approval Page" (element #3) through "Figures" (element #15)
3. Thesis Approval Page
 - a. include the name and title of the primary thesis advisor, MSE program Coordinator, Director of Graduate Studies & Continuing Education, and any additional readers, along with a blank line upon which each individual can provide their signature
4. Acknowledgements
 - a. students may provide written thanks to any individuals who assisted them in a significant manner in the course of their work within the MSE program and/or preparation of their thesis
5. Abstract
 - a. summarize the entire project, by briefly reviewing the critical elements of the Introduction, Method, Results, and Discussion sections of the thesis
 - b. APA style dictates that this section is no longer than 120 words; for the MSE program, this section must be no longer than 1 page.
6. Introduction (≈ 10-12 pages)
 - a. begin thesis by identifying a specific problem area within the field and explain why this is an important topic to investigate
 - b. literature is then reviewed by summarizing and integrating at least 5-10 sources, showing how they are similar/different (and not just listing one finding after another), and how they each connect to the main theme
 - c. the purpose of the student's research is mentioned near the end of the section, including a rationale as to how/why this study is necessary in relation to the just-reviewed literature
 - d. conclude the Introduction by BRIEFLY describing your methodology and stating your hypothesized results
7. Method
 - a. this section should be subdivided into separate "Participants," "Design," "Materials," and "Procedure" sections
 - b. PARTICIPANTS: include a description of the number and type of subjects used in the study, including the number of male/female subjects, their average ages, how they were recruited and compensated, and any other important demographic characteristics of the sample
 - c. DESIGN: describe the structure of the experiment, with clear operational definitions of all independent and dependent variables; any special variable coding procedures that were necessary prior to data analysis should also be outlined
 - d. MATERIALS: include a detailed description of all essential materials/equipment used in the course of your research; elaborate items (e.g., surveys, stimuli lists, etc.) should be summarized here and provided in full in an Appendix (see below)

- e. PROCEDURE: detail what happened to each participant, from the start through finish of each experiment session; any preparatory/concluding activities, performed by the researcher but not involving participants, should not be included here
8. Results
 - a. all projects should include the following elements, although studies with multiple Dependent Variables should utilize separate paragraphs for each measured element
 - b. begin with a verbal statement of your hypothesis, making specific reference to your Independent and Dependent variables
 - c. verbally describe the pattern of your results (including consistency with hypothesis), referring to actual data appearing in Tables/Figures
 - d. provide significance decisions (and effect sizes) in relation to all appropriate and necessary statistical techniques used to analyze your data, using proper APA style
 9. Discussion (\approx 4-6 pages)
 - a. begin this section by reviewing all hypothesis and re-stating whether or not these predictions were supported by the collected data
 - b. explain why your results occurred in the manner you observed, according to referenced sources
 - c. connect your results to the existing literature reviewed in the Introduction, explaining what your data adds to what is known about the topic under investigation
 - d. describe potential limitations/flaws of your research, including issues related to i) design/internal validity, ii) external validity, and/or iii) measurement/analysis of dependent variables, as well as possible remedies for these sources of error
 - e. explore the direction(s) of possible future research within your domain
 - f. conclude the thesis by exploring any potential real-world implications of your data
 10. References
 - a. all sources mentioned within the thesis must be cited using proper APA style
 11. Footnotes
 - a. elaborate on any noted comments within the primary portions (Introduction, Method, Results, Discussion) of the thesis
 12. Appendices
 - a. present any necessary ancillary materials, cited earlier within the primary portions of the thesis
 13. Tables
 - a. present data in APA-style Tables, including descriptions of data and effective row/column organization
 - b. avoid redundancy with data presented in the text of the Results section
 - c. do not present identical data in Figures
 - d. each Table appears on its own page
 14. Figure Captions
 - a. descriptions of each Figure (including Figure numbers) are clearly presented
 15. Figures
 - a. present data in APA-style Figures, such as line charts, bar graphs, etc.
 - b. avoid redundancy with data presented in the text of the Results section
 - c. do not present identical data in Tables
 - d. each Figure appears on its own page

VI. THESIS REVIEW TIMELINE & FINAL COMMITTEE MEETING

1. No later than 2 months before the graduation date, the preliminary draft of the thesis should be submitted to the thesis advisor for review and suggestions. The Thesis Advisor would have one week to read and make comments and get the paper back to the student.
2. The student would make any suggested changes and re-submit the revised draft to the thesis advisor.

3. Steps 1 and 2 will continue until the Thesis Advisor approves the draft for submission to the other members of the Thesis Committee (which can then suggest additional revisions).
4. Once the draft is approved by the Thesis Advisor, the student will (a) submit the final draft to the other Thesis Committee members, and (b) schedule the Final Committee Meeting with the Thesis Committee. This meeting (which should occur no sooner than 1 week after the Committee has received the student's final draft) provides an opportunity for the student to present his/her research. The student should provide a brief statement about the background/rationale of the study, the research question(s), and corresponding hypothesis(es). The primary discussion should center on how the data was collected and analyzed, and what conclusions were drawn about the primary topic investigated by the student. The student should also be prepared to address questions raised by the Thesis Committee. Immediately following the student's presentation, the Thesis Committee (without the student's presence) will discuss the final draft and either (a) approve the thesis as presented or (b) require revisions to the thesis. The Thesis Committee will then immediately inform the student of their decision.
5. The student must make any final revisions within one week of the Final Committee Meeting
6. The final version of the thesis is due one month before graduation.

VII. FINAL THESIS SUBMISSION

Once all requested changes (from all members of the Thesis Committee) have been made to the thesis, the student must prepare the thesis for official campus archiving, which involves several elements.

1. The student should conduct a final review of spelling and grammar within the thesis, correcting any remaining errors.
2. The student must submit two (2) copies of their thesis to the Coordinator of the MSE program.
3. Within the thesis, printing must be single-sided.
4. A higher quality paper (as opposed to regular copying paper) should be used when printing the two final copies.
5. Thesis Committee Members should use a blue pen only to sign the thesis on the Approval Page.
6. The thesis must be submitted in a binder.

APPENDIX:

Samples of Preliminary Thesis Pages

Utilization of Advance Organizers in Grade 10 Biology Courses

In partial fulfillment for a
Master's of Science Education degree
at
Lebanon Valley College

Joe Student

December 2002

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This thesis for a Master's of Science Education degree by Joe Student has been approved on behalf of the Master of Science Education Program by:

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Thesis Advisor
Professor & Chair of Psychology

Kerrie Smedley, PhD
Second Reader
Associate Professor of Psychology

Patricia Woods, BS
MSE Program Coordinator

Elaine Feather, MS
Director of Graduate Studies & Continuing Education

Acknowledgements

Lou Manza, PhD - Thesis Advisor

Thank you for including me in your busy schedule this fall. I appreciate the guidance you provided as I finished this project--especially in terms of helping me make sense of the statistics and writing the results.

Kerrie Smedley, PhD - Professor of MSE 829: Research Methods

The time and effort that you invested during the research methods course was greatly appreciated. Your expertise in conducting research and writing a master's thesis is impressive. I am very glad I took the research methods course. Not only did I learn a lot in that course, but I was also motivated to "put my all" into this project. Thank you!

Mrs. Teacher's period 5 and 6 biology students at Local Area High School - Test Subjects

Thanks for participating in this study. You did a great job!

Pat Woods - MSE Coordinator

It has been great working with you throughout the past few years--first as I worked for you and the Science Education Partnership, and second as you guided me through this program. Surely, you will not be rid of me now! I will stop by often to borrow science materials!

Lebanon Valley College - Master of Science Education Program

I have enjoyed these courses and have gained many useful ideas for use in my classroom. Thanks for offering this program.

Jane Student - My wife

Thanks for "picking up the slack" around the house when I was busy working on this project. Your encouragement to work on this paper when I really did not feel like it is what kept me focused. Thank you!