RESEARCH HANDBOOK

College of Health Professions

Grand Valley State University

Physical Therapy Clinical Doctoral Program

Department of
Physical Therapy

2015 – 2016 Edition

INTRODUCTION

This manual will provide you with an overview of the research requirements for the Doctorate in Physical Therapy at Grand Valley State University. It will serve as a guide for your research activities throughout the respective programs and will complement the reference materials required for your classes. Specifically, you should use this manual in conjunction with 1) the appropriate research text as recommended by your research mentor, 2) the appropriate style manual American Medical Association (AMA) or American Psychological Association (APA) as recommended by your research mentor, and 3) the appropriate procedures to follow regarding the specific format of your research.

Please familiarize yourselves with these pages. Your faculty will expect you to be responsible for their contents throughout the program. Please direct any questions to a member of the faculty, who will be happy to help you find the information you need.

Please keep in mind that this handbook should be used as your primary reference.

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Part I
FOUNDATIONS

RESEARCH REQUIREMENTS FOR THE DOCTORATE IN PHYSICAL THERAPY AT GRAND VALLEY STATE UNIVERSITY

Physical therapy research involves examination of the relationships among clinical phenomena and between clinical and theoretical perspectives. Physical therapists have long been aware that much research is needed to establish valid and reliable data that will justify clinical practice. However, recent economic pressures have challenged the professions to accelerate that process.

During the first phase of the DPT program, students establish a foundation for engaging in a research project. The final portion of the program is devoted to the research requirement in which students perform their own studies.

FOUNDATIONS

Research begins with identifying the sources of our existing knowledge base, an understanding of the research process, and a comparison of different types of research and of the philosophical base for each. Next, students must gain an appreciation of the role of theory in clinical research and of the ethical issues that the process raises.

Literature Reviews

The ability to distill important information from a large quantity of material gives the researcher the means to quickly identify material relevant to his/her subject and to determine what material will apply to his/her own work. In PT 510 students begin to summarize and analyze the work of others by reviewing articles on a particular subject. Students will conduct more extensive literature reviews later in the program starting in the Fall semester second year in PT 610 and will continue as they perform and complete their research in PT 790/793.

Writing Abstracts and Critical Review

Writing abstracts also refines the ability to distill and summarize important information. In many courses in the three curricula, students will practice summarizing specific research studies with a written abstract of the literature. Because the faculty believes that this skill is extremely important, students will continue to write abstracts throughout the program, and learn to critique the work of others. Students learn to write abstracts and critically evaluate the importance of research studies to the field of knowledge.

Research Proposals

To write a research proposal, practitioners must have a solid understanding of basic facts and theories in the area of interest and use their understanding and curiosity to generate testable or theory generating questions (hypotheses). Clinicians also must have a working knowledge of measurement theory and concepts and be able to apply design principles and statistical tests for quantitative studies, as well as measures of trustworthiness for qualitative studies, as appropriate. Students will be able to practice developing these skills during their respective programs.

ETHICS IN RESEARCH

Scientists subscribe to a code of ethics for the research process (Portney & Watkins, 2009). Ethics become important in planning a project, in implementing it, and in protecting human dignity and rights throughout the process.

Chapter 3 of Portney & Watkins (2009) provides a general overview of ethical responsibilities involved in research. However, respective Codes of Ethics and Guides for Professional Conduct govern members of the three professions who engage in research activities. The articles on the following pages describe those specific responsibilities in detail.

Message from the Editor:

Andrew A. Guccione, Ph.D., P.T. graciously agreed to write a follow-up piece to his article "Are the Ethics of Clinical Research the Same as the Ethics of Clinical Practice?" which appeared in the Spring 1992 Newsletter. To repeat his background, Dr. Guccione is the Director of Clinical Development, Education and Quality Assurance, Physical Therapy Services, Massachusetts General Hospital and Lecturer in Orthopedics at Harvard University. Note: If space allows we will publish the APTA document "Integrity in Physical Therapy Research in the next Newsletter."

Thomas P. Mayhew

Signposts to Integrity: Guidelines for the Ethical Conduct of Research By: Andrew A. Guccione, Ph.D., P.T.

Previously, I argued that the general ethical principles which guide clinical practice could also be used to guide clinical research (Research Section Newsletter, Vol. 25, No. 1, 1992, pp. 2 – 4. In fact, the physical therapist clinical researcher also may take advantage of two documents to review the ethical justification of any proposed research. These two documents are the American Physical Therapy Association (APTA) *Code of Ethics* and its interpretive *Guide for Professional Conduct*, which is well- known to all physical therapists, and the lesser known, but equally as valuable, APTA document, *Integrity in Physical Therapy Research.* The current version of the *Code of Ethics* was adopted by APTA's House of Delegates in 1981, and amended in 1987 and 1991. *Integrity in Physical Therapy Research*, which was developed by the APTA's Board of Director's in 1985, and later amended in 1987. The purpose of this article will be to highlight these two documents and to demonstrate how each further elaborates the ethical obligations of the physical therapists researcher described in the other.

Principal 1 of the *Code* denotes that physical therapists respect the rights and dignity of all individuals. Specifically, the document on *Integrity* requires that a research subject's participation is "voluntary, free of coercion and deception, and based on an understanding by the subjects, or their legally authorized representatives, of nature of the research and its expected benefits and risks." Immediately, one thinks of how this obligation might apply to researchers working with very young children, or individuals who may not have the cognitive ability to understand the nature of the research, as required by this guideline. Many of these persons may not have a clearly identified representative who can give consent to participate in research. Certain settings, such as nursing homes or custodial environments for the severely handicapped, can be particularly problematic with respect to the informed consent of the subject. While the *Code* emphasizes the place of confidentiality in patient care, the document on *Integrity* is equally stringent in guarding the privacy of research subjects once they have consented to participate.

The document on *Integrity* does not limit its guidelines to research on humans. Increasingly, physical therapists are engaged in animal research. Specifically, this document enjoins therapists to engage in the humane treatment of animals while they are used in research, and requires that sacrifice, when necessary, be conducted humanely as well. (I.A.2). Physical therapist researchers

are also reminded to comply with all federal, state and local regulations governing the use of animals for research. Overall, both *Integrity in Physical Therapy Research* and the *Code* each emphasize compliance with the law as an essential element to ethical clinical practice and research.

Truth-telling is as critical to the scientist's relationship to the professional scientific community as it is to the clinician's relationship with the patient. Under Principal 4 of the *Code*, we are obligated to "maintain and promote high standards for physical therapy practice, education and research." Furthermore, the *Code* requires that "physical therapists provide accurate information to the consumer about the profession and those services they provide" (Principal 6). When the physical therapist's services are research, we are no less exempt from providing accurate information to both the purchaser of our research services, the funding agency, or the consumer, the person who reads and hopefully uses the research to improve patient care. Specifically, the *Code* indicates that fraud and plagiarism are not acceptable (*Guide for Professional Conduct, 4.3.B.4)* and that there should be appropriate acknowledgment of individuals making a contribution to the research. Currently, there is a trend in physical therapy to mix student and faculty research in a way which blurs distinctions between the two, and often enough creates confusion in rights to authorship to a degree belied by the individual's actual contribution to the published product is an ethically troublesome practice.

Physical therapists who are listed as authors of a study must also accept responsibility to "use, or participate in the use of, any form of communication containing a false, plagiarized, fraudulent misleading,deceptive, unfair or sensational statement or claim" (*Guide for Professional Conduct, 6.2.C).* Therefore, all researchers who share credit for a manuscript must also accept blame if the research has not been conducted or reported ethically. The response, "I was only the third author on the student's paper" would most likely be rejected as an adequate defense of one's conduct. The document on *Integrity* further elaborates on these points.

In addition to honesty, confidentiality and accuracy *Integrity in Physical Therapy Research* explicitly delineates three characteristics of ethical research which are only implied in the *Code*: openness, credibility, and thoroughness. Openness in research requires that researchers "make every effort to report their research and research results to the appropriate professional community." (III.B.1). Previously, I have noted that the general principles of ethics as applied to research usually demand such reporting.

In many instances, appeals to the common good are contained in letters of informed consent. If the research is not reported, the researcher cannot be faithful to the promise made to the research subject to contribute to the common good in exchange for the subject's participation.

Credibility, as presented in *Integrity in Physical Therapy Research*, obligates that researchers "base their studies on a thorough knowledge and consideration of the pertinent professional and scientific literature" (III.C.2). Furthermore, this document also indicates that the “legitimate and logically correct choice of research design and data analysis” are key factors in the ethical conduct of research (III.C.3). Once again, it is noted that well planned studies are moral imperative, and not merely a scientific one. Research studies, which cannot promote the growth of knowledge, either through design or execution, require serious scrutiny from the moral point of view.

Concomitantly, thoroughness in research extends the researcher's ethical commitment through to reporting the study. Specifically, “physical therapists should make every effort to ensure that research reports contain information sufficient to enable constructive criticism and replication of the research and to identify and discuss the influence of bias in the research.” (III.E). Thus, it is also incumbent on individuals reviewing research to ask whether the author has supplied sufficient information which would allow the study to be replicated prior to recommending publication.

Finally, both the *Code* and the document on *Integrity* are unequivocal in demanding that physical therapists take active responsibility for unethical, incompetent, or illegal acts. Particularly, *Integrity in Physical Therapy Research* reminds physical therapists that justified criticism must be made collegially, but indeed must be made, and should be accepted "without recrimination or reprisal, as part of the process of the search for truth" (IV.D.2).

Although physical therapists may be entering uncharted territory as we scientifically establish our body of knowledge, we do not engage in this task without a moral compass or a map. Physical therapists can and do conduct ethical research using the same ethical principles, which guide clinical practice and the *Code of Ethics* and the *Guide for Professional Conduct*. More specific applications of ethical standards to research in physical therapy are found in *Integrity in Physical Therapy Research.* In the end, these documents serve as boundaries to professional behavior that demarcate the ethical value of physical therapy research and the moral commitment of physical therapists researchers. Acknowledgment: I am grateful to Eugene Michels for suggesting this topic to me.

Resources for this article:

APTA *Code of Ethics and Guide for Professional Conduct*. Alexandria VA, APTA, 1991

Integrity in Physical Therapy Research, APTA, 1987

Integrity in Physical Therapy Research

INTEGRITY IN RESEARCH BOD Y03-06-20-52 [Amended BOD Y11-01-05-06; BOD 03-99-22-71; BOD 11-96-26-106; BOD 11-87-22-85; Initial BOD 03-85-44-152] [Policy]

PREAMBLE

The American Physical Therapy Association (APTA) and its members are committed to encouraging and improving research in physical therapy. This commitment is grounded in the Association's Object and Functions, as set out in its Bylaws. The Association and profession are committed to maintaining and promoting professional ethics in physical therapy, including the ethics of research engaged in by and for the benefit of the profession. This commitment is grounded in the *Guide for Professional Conduct*, which is binding on all physical therapist members of *APTA, Guide for Conduct of the Physical Therapist Assistant*, which is binding on all physical therapist assistant members, and the *Guide to Physical Therapist Practice*.

A concern for integrity in research follows quite naturally from the dual commitment to research and professional ethics. Integrity in research requires that the research be humane and both professionally and scientifically acceptable. Essential to integrity in physical therapy research are certain considerations addressed in this document.

The number of physical therapists who design, conduct, and report, or otherwise engage in, research is growing. Physical therapist assistants may assist the physical therapist in data collection. Many of these physical therapists, physical therapist assistants, and students, who are learning to do research, and their mentors, may not have ready access to guidance or advice on the considerations that are essential to integrity in physical therapy research. This document was developed to satisfy that need.

PURPOSE AND USE

The statements in this document are offered as considerations for physical therapists who design, conduct, and report, or otherwise engage in research. Individual and collective attention to these considerations will help assure integrity in physical therapy research.

The statements are not to be considered inclusive of all the situations to which they might apply. Developments within and outside physical therapy, including societal trends and changes in law and regulation, will require that the statements be continuously reviewed and modified as warranted. Additional statements will be developed as needed to address situations not now addressed in this document. No attempt was made to include or append detailed information from, or examples of, the materials which were reviewed in developing this document. The uses of and responses to this document will be reviewed to determine at a later date the need for including or appending detailed information and examples.

The statements in this document are not intended to codify, explain, modify, or replace, in whole or in part, any of the ethical principles in the Association's *Code of Ethics* or any of the interpretations in the *Guide for Professional Conduct* issued by the Association's Ethics and Judicial Committee.

I. THE RIGHTS, PRIVACY, AND WELL-BEING OF RESEARCH SUBJECTS

A. Rights of Subjects

1. Physical therapists should ensure that the participation of human subjects in research is voluntary, free of coercion and deception, and

based on an understanding by the subjects, or their legally authorized representatives, of the nature of the research and its expected benefits and risks.

a. Human subjects, or their legally authorized representatives, should not be made to waive or appear to waive any of the subjects' legal rights, or to release or appear to release the investigator, the sponsoring or funding agency, or the institution or any of its agents from liability for negligence.

b. Human subjects, or their legally authorized representatives, should be informed as to whether any compensation or treatment is available to the subjects if any physical injury results from the research.

2. Physical therapists should ensure that animal subjects used in research are treated humanely and, if sacrifice is necessary, are euthanized in a humane manner. Euthanization must be carried out in accordance with governmental and institutional regulations.

B. Confidentiality and Privacy

1. Physical therapists should ensure that data and observations obtained on human subjects who participate in research are recorded, stored, and reported in ways that protect the individual and personal identity of the subjects. Research must be compliant with the standards set forth in HIPAA regulations.

a. The information furnished to human subjects, or their legally authorized representatives, should include statement of the extent to which the confidentiality of data and observations on individual subjects will be maintained.

b. In situations where patients/clients participate as human subjects in research, consideration may be given to releasing data and observations which reveal the identity of individual subjects to specified persons for purposes of real or potential benefit to the subjects. The subjects, or their legally authorized representatives, should be informed of and consent to such identification before the release is made.

c. Signed release for the publication or exhibitions, or other scientific or educational use, of photographic or other recorded images of human subjects who participate in research should be obtained from the subjects or their legally authorized representatives.

2. In situations where research procedures require the simultaneous presence of more than one human subject, or one or more groups of human subjects, physical therapists should ensure that the individual subjects have the maximum possible privacy during their participation.

C. Risk to Subjects

1. Physical therapists should identify and reduce as far as is possible the risk of physical, psychological, or social harm to research subjects.

a. Proposals of research requiring the application of experimental procedures or the imposition of experimental conditions should be submitted to institutional review boards or similar review bodies for independent assessment of the expected risk of physical, psychological, or social harm to research subjects.

b. The use of experimental procedures or conditions should be suspended if research subjects incur physical, psychological, or social harm to an extent or in a form which exceeds or deviates from the expected risk of harm. A full report on the procedures or conditions used, and the resultant harm observed, should be submitted for study by the appropriate review body. The use of the procedures or conditions should be resumed only if the review body approves the resumption.

D. Well-Being of Subjects

1. Physical therapists should be guided at all times by concern for the physical, psychological, and social well-being of research subjects.

2. Research conducted by physical therapists on live animals should be done only in facilities that comply with the Code of Federal Regulations, Title 9, Subchapter A - Animal Welfare, and that either are accredited by the American Association for Accreditation of Laboratory Animal Care or have institutional committees which review animal facilities and practices for compliance with the National Institutes of Health Guide for the Care and Use of Laboratory Animals, and that comply with pertinent local laws and regulations governing the housing, care, and feeding of animals.

II. OBSERVANCE OF THE LAWS AND REGULATION GOVERNING RESEARCH

A. Laws and Regulations

Physical therapists who engage in research on human subjects who are patients/clients should comply with the laws and regulations governing the practice of physical therapy in the jurisdiction in which the research is done on those subjects.

B. Institutional Requirements

Physical therapists should comply with the requirements governing the approval and conduct of research within the institutional or organizational settings in which they engage in research. If there are no requirements governing the approval and conduct of research within the institutional or organizational setting, the physical therapist should make every effort to assist in developing and implementing such requirements.

III. MAINTENANCE AND PROMOTION OF PROFESSIONAL AND SCIENTIFIC ACCEPTABILITY IN RESEARCH

A. Honesty

1. Physical therapists should ensure that truthful statements and descriptions of the required information are contained in research proposals submitted to institutional review boards, funding agencies, and others for approval.

2. Physical therapists should adhere to the purposes and methods of approval research projects.

a. Deviations from the purposes and methods of approved research projects should be avoided except when made in accordance with the policies and procedures of the approving bodies or persons.

3. Physical therapists should ensure that research reports provide truthful statements of the work done and the findings obtained in their research.

a. The deliberate misrepresentation or falsification of results, the suppression of findings, and the presentation of another's work as ones own should be avoided.

b. Every effort should be made to disclose the bias that can occur in the interpretation of research results when financial support of any kind, before, during, or after the research is done, is received from any party that may stand to gain financially from the results of the research.

B. Openness

1. Both positive and negative results should be reported.

2. Physical therapists should make every effort to report their research and research results to

the appropriate professional or scientific community.

3. Physical therapists should make every effort to honor the requests of their professional and scientific colleagues for access to the data obtained in research. The purposes of such requests and the uses to which the data will be put should be mutually agreed in writing. The individual and personal identity of human subjects should be fully protected when access to data is provided.

4. Physical therapists should identify publicly any potential conflict of interest that might compromise, or might be perceived as compromising, the interpretation of their research and research results.

C. Credibility

1. Physical therapists should recognize that ensuring the credibility of research and research findings is an obligation to be assumed in exchange for the trust and cooperation of research subjects, the support of involved institutions and agencies, and the expected attention and consideration of the professional and scientific community.

2. Physical therapists should base their studies on a thorough knowledge and consideration of the pertinent professional and scientific literature.

3. Physical therapists should make every effort to ensure the legitimate and logically correct choice of research design and data analysis, the avoidance of bias in selection or assignment of subjects, and the professionally skillful performance of appropriate treatment methods and reliable measurement procedures for their studies.

a. In the course of designing their studies and preparing research protocols and proposals, physical therapists should seek the constructive criticism of their professional and scientific colleagues.

b. The advice of a competent consultant should be sought if there is any question or doubt about the choice of research design and data analysis for a study. This advice should extend to the presentation and interpretation of results when the study is completed.

D. Accuracy

Physical therapists should make every effort to ensure that research reports contain descriptions, findings, and references that are free from error.

E. Thoroughness

Physical therapists should make every effort to ensure that research reports contain information sufficient to enable constructive criticism and replication of the research and to identify and discuss the influence of bias in the research. Written reports of research should contain brief descriptions of the steps taken to assure the protection of the rights, confidentiality and privacy, and well-being of research subjects.

F. Acknowledgment

1. Physical therapists should publicly acknowledge, in the appropriate form, both the fact and the source of any financial support, consultation, or assistance received for research that is reported.

2. Physical therapists should publicly identify, in the appropriate form, the institutions or facilities where reported research was done and the affiliations of the authors of the research reports. The identities of institutions, agencies, or organizations which serve as the objects of study should be confidential unless written consent to reveal the identities is obtained from authorized officials in those institutions, agencies, or organizations.

3. When the acknowledgment of degrees held by authors of research reports is required or

permitted, authors should confine this acknowledgment to their earned degree(s) only.

IV. UNETHICAL, INCOMPETENT, OR ILLEGAL ACTS IN RESEARCH

A. Intervention

1. Physical therapists should intervene directly in the conduct or reporting of research, for which they are responsible or in which they participate, to prevent or correct any acts which are unethical, incompetent, or illegal.

2. Physical therapists should dissociate themselves from the conduct of any research or from the preparation of any research report in which unethical, incompetent, or illegal acts occur or may occur and have not been, or are unlikely to be, prevented or corrected by direct intervention.

B. Reporting

1. Physical therapists should report to the appropriate institution or facility the facts regarding any acts in the conduct of research which appear to be unethical or illegal, or the facts regarding any acts in the conduct of research which appear to be incompetent and of actual or potential harm which exceeds or deviates from the expected risk of harm to research projects.

2. Physical therapists should report to the appropriate institution or facility the facts regarding any published or oral report of research which appears to be fraudulent.

C. Investigation

1. Physical therapists under investigation because of alleged unethical, incompetent, or illegal acts in the conduct or reporting of research should cooperate in the investigation and accept the investigation, without recrimination or reprisal, as part of the process of the search for truth.

2. Physical therapists appointed to investigate alleged unethical, incompetent, or illegal acts in the conduct or reporting of research should be objective in exercising judgment within the scope of the inquiry, should possess the special competencies necessary to understand the research in question, and should not be associated with the person or persons under investigation.

D. Criticism

1. Physical therapists should comment critically, objectively, constructively, and openly on any reports of research which they consider to be professionally or scientifically unacceptable.

a. Constructive criticism of research should be well-founded and should include suggestions for enhancing the acceptability of the research.

Physical therapists whose reports of research are criticized as representing research which is professionally or scientifically unacceptable should respond objectively to the criticism, and without recrimination or reprisal, as part of the process of the search for truth.

(Research Department, ext 3228)

Explanation of Reference Numbers: BOD P00-00-00-00 stands for Board of Directors/month/year/page/vote in the Board of Directors Minutes; the "P" indicates that it is a position (see below). For example, BOD P11-97-06-18 means that this position can be found in the November 1997 Board of Directors minutes on Page 6 and that it was Vote 18.
P: Position | S: Standard | G: Guideline | Y: Policy | R: Procedure

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THE LITERATURE REVIEW

The review of literature involves a comprehensive, critical examination of relevant research and theory in a specific content area. The literature review identifies what knowledge is accepted professionally, what is controversial, and what assumptions in the field remain yet unsubstantiated.

Literature reviews serve several functions (Portney & Watkins, 2009):

1. To provide a source of research questions
2. To establish a theoretical base for study
3. To understand what research has already been performed
4. To provide a researcher with methods and instrumentation for study
5. To examine validity and reliability of instrumentation
6. To determine the potential for successful outcomes
7. To provide the basis for examining assumptions and establishing limitations of a study

See pp 741-757 in Portney & Watkins (2009) for more information on the literature review.

Information on searching the literature for research study is available through the library. Guided tours and informational classes on computer searches are also available. It is your responsibility to investigate the appropriate processes/services needed to complete your research and class assignments. Researchers should be knowledgeable about copyright policies and US law when accessing hard copy and electronic resources.

U.S. COPYRIGHT LAW

NOTICE

WARNING CONCERNING COPYRIGHT RESTRICTIONS

The Copyright Law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted material.

Under certain conditions specified in the law, libraries and archives are authorized to furnish a photocopy or other reproduction. One of these specified conditions is that the photocopy or reproduction is not to be "used for any purpose other than provide study, scholarship, or research." If a user makes a request for, or later uses, a photocopy or reproduction for purposes in excess of "fair use," that user may be liable for copyright infringement.

This institution reserves the right to refuse to accept a copying order if, in its judgment, fulfillment of the order would involve violation of the copyright law.

Students must request permission to reproduce paragraphs, charts, graphs, tables, photographs, etc. to include in their research reports. Please direct your requests to the publisher of the article, journal or book. The library staff may be able to assist you with telephone numbers or addresses.

WRITING ABSTRACTS

The following article contains APTA instructions for writing abstracts for the journal Physical Therapy. This article gives a detailed overview of what is involved in writing scientific abstracts.

The Journal of the American Physical Therapy Association and most medical journals are written in the writing style of the American Medical Association (AMA). Please consider this information when you write assignments for class so you know which style your research mentor wants it written in, as well as which style would be most appropriate considering your content and the journal in which you may want to submit your research for publication.

Both the AMA and APA style manuals refer to journal writing. There will be some differences when writing a thesis or thesis proposal. See Appendix A of this handbook for more information on formatting the research project.

Specific formatting guidelines for abstracts when submitting for publication are based on journal-specific requirements. Likewise, if an abstract is written for submission for conference presentation, specific guidelines are provided by supporting professional organization.

ABSTRACTS OF CURRENT LITERATURE

How to Write an Abstract

Writing Abstracts: For abstracts of reports of research, the essential four parts to note are 1) *purpose* of the study (Why did the author do it?), 2) *method* used (How did the author design and carry out the procedures?), 3) *results* of the proceedings (What happened?), 4) *conclusions* of the author (What was learned by all this?) The abstracter's job is to give a brief account of the important information in each of these sections. Additionally, for research articles it is not necessary to include at the beginning of the abstract a statement of the problem because the purpose usually defines the scope of the study.

One problem with writing abstracts on research articles occurs when the article to be abstracted is not put together properly. For example, if the author of the article did not clearly state his purpose, it is impossible to figure it out for the abstract. If any of these four sections is missing, look for another article to abstract.

For abstracts of all types of articles, it is essential to note the purpose of the article, the pertinent data related to the type of paper presented, the important conclusions, and the clinical relevance discussed by the author.

Tense: Always write the abstract in the *past* tense for reporting work done in the past. Using the present tense is not only grammatically incorrect, but can cause confusion over what the original article actually stated. "The study results do not have clinical relevance" could be taken as the personal opinion of the abstracter rather than what was reported by the author. To clarify, use past tense and identify the maker of the statement: "The authors said they found no clinically relevant results."

Most abstracts report work that was done in the past so it is logical to say "the authors found" or "the results showed." Some abstracts dealing with such material as theories and concepts, however, may need to include both past and present tenses, such as "the author stated he believes all men are created equal."

Content: The abstract should give the reader a good idea of what to find in the article, not an abbreviated version of all the information it contains. Include only pertinent data germane to the central point, and stay within 150 to 300 words depending on journal type and/or conference submission. For the purposes of the GVSU library research product and DPT research day abstracts should follow MPTA guidelines (see Appendix L). Including too many facts results in an imbalanced description of the article and will probably make the abstract too long. The abstract must be able to stand alone as a digest of the significant information found in the article, but the abstract is not intended to substitute for the article.

Include only information reported by the author in the article. Do not use related information and facts that the article did not contain. Do not inject your own general information. Take any needed background information from the original article and identify it as such. For example, rather than

"Hand surgery is risky," state "The authors emphasized that because hand surgery is risky, the patients must be..." Make certain you include only those conclusions or opinions presented by the author. Whether you agree with a study, the methods, or the validity of any of the results, the abstract must not reflect the opinions. Also indicate differences between the author's facts and opinions. For example, say either "The study showed the discrepancy resulted from…" or "The author believed the discrepancy resulted from..."

Clarity and Simplicity: Attempt to make the abstract understandable to as many people as possible, including physical therapists (researchers, therapists, assistants, and students), allied health professionals, and interested nonprofessionals. The key idea is to simplify. Examine three-syllable (and more) words closely. If a shorter word can say the same thing, use it. Here are some examples of swaps that work: repeat for replication, use for usage or utilization, and many for manifold.

When simplifying, however, avoid slang. Anatomical terms should be complete (quadriceps are quadriceps femoris muscles), disease processes should be exact (strokes are cerebrovascular accidents), and individuals usually should not be defined by their dysfunction's (cystic fibrosis children are children with cystic fibrosis).

Statistics and Abbreviations: One way to achieve clarity and simplicity is to include only essential statistics and abbreviations. Use statistics to register the significance of results, and only list key results. Use standard abbreviations. Use special abbreviations sparingly.

The following examples use the format required for DPT written product submission and for abstract submission on DPT Research Day.

DPT Research Day Abstract: Research Project

THE EFFECTS OF SPEED-DEPENDENT TREADMILL TRAINING AND RYTHMIC AUDITORY-CUED OVERGROUND WALKING ON GAIT FUNCTION, BALANCE FUNCTION, FALL RISK, AND FALL INCIDENCE IN INDIVIDUALS WITH IDIOPATHIC PARKINSON'S DISEASE: A RANDOMIZED CONTROLLED TRIAL. Karl KL, Tomassi EM, VanHaitsma RJ, Harro CC, Shoemaker MJ; Grand Valley State University, Grand Rapids, MI.

INTRODUCTION: Externally-cued locomotor training paradigms such as speed-dependent treadmill training (SDTT) and rhythmic auditory-cued (RAC) overground walking have been shown to improve gait deficits in individuals with Parkinson's Disease (PD), but the effects on balance function and fall risk are inadequately studied. The purpose of this single-blinded, randomized controlled study was to examine and compare the immediate and retention effects of progressive SDTT and RAC training on gait function, balance function, and fall risk in individuals with PD.
METHODS: Twenty participants (mean age 66.1 years) with idiopathic PD were randomized into either SDTT (n=10) or RAC (n=10) locomotor training. Training consisted of 30-minute sessions, 3x/week for 6 weeks. The SDTT protocol involved progressive-speed, interval-based treadmill training. The RAC protocol involved interval-based auditory-cued overground walking using a progressive beats per minute music playlist. Dependent measures examined immediate and retention

effects on gait function [comfortable and fast gait speed (CGS, FGS), Functional Gait Assessment (FGA), and 6-Minute Walk Test (6MWT)] as well as on balance function and fall risk [FGA, Berg Balance Scale (BBS), Rapid Step-Up Test (RST), Activities-Specific Balance Confidence Scale, and NeuroCom Sensory Organization Test (SOT), Motor Control Test (MCT), & Limits of Stability (LOS)]. Fall incidence was assessed prospectively based on six monthly self-report fall calendars. Dependent paired t-tests were used to examine within-group training effects, and independent t-tests examined between-group training effects (alpha level $p < .05$). **RESULTS:** Findings revealed immediate within-group training effects for gait measures including statistically significant gains in CGS, 6MWT, and FGA for the RAC group and in FGS, 6MWT, and FGA for the SDTT group. All gains were retained for the RAC group, and FGS and FGA gains were retained for the SDTT group. Significant gains in balance measures were observed post-training in BBS, RST, and SOT for the RAC group and in RST, SOT, and LOS for the SDTT group. Gains were retained in all measures for the RAC group, but only RST gains were retained for the SDTT group. No significant differences in training effects on gait and balance function were found between groups from baseline to post-training or from post-training to the 3-month follow-up. No clear trend in reduction in fall frequency or fall classification was evident based on fall report data. **DISCUSSION:** This was the first study to demonstrate both immediate and retention training effects of cued locomotor paradigms on balance, mobility, and fall risk reduction in the PD cohort. **CONCLUSION:** These results provide evidence that an externally-cued locomotor training program with progressive speed challenges, either overground with RAC or on a treadmill, produce significant improvements in walking speed, endurance, and dynamic balance function. These changes are clinically relevant as locomotor training is one critical component in a multi-factorial approach to fall risk reduction in PD.
ACKNOWLEDGMENTS: To our collaborators at Hauenstein Neuroscience Center, SMHC.

DPT Research Day Abstract: Case Report

APPLICATION AND EFFECTIVENESS OF TARGETED INTERVENTIONS FOR REMEDIATION OF PUSHER SYNDROME IN AN INDIVIDUAL POST-STROKE: A CASE REPORT Hudson K, Harro C; Grand Valley State University, Grand Rapids, MI.
INTRODUCTION: Pusher Syndrome (PS) is a unique, postural control impairment seen in 10% of persons post-stroke, which is characterized by a patient's misperception of postural orientation in relation to gravity. Diagnostic criteria for PS include (1) tilted spontaneous body posture, (2) active pushing towards hemi-paretic side, and (3) resistance to passive correction. PS adversely affects functional skills and slows the rate of recovery during rehabilitation. The etiology underlying PS is unknown and there is little evidence regarding effective intervention strategies for this clinical population. **PURPOSE:** The purpose of this case report is to describe the application of targeted intervention strategies to remediate PS and examine the effectiveness of these strategies on functional recovery in a patient with sub-acute stroke in the inpatient rehabilitation (IPR) setting. **CASE DESCRIPTION: Subject:** The patient, DS, was a 68 year-old female who suffered a large, left hemorrhagic stroke with subsequent midline shift. Following a complicated acute medical course, DS was admitted to IPR four weeks post-stroke for intensive multi-disciplinary training. Physical therapy (PT) initial evaluation revealed that DS had severe right-sided hemiparesis, expressive and receptive aphasia, markedly impaired postural control in sitting and standing with evidence of PS, and required maximal to total assistance for all functional skills. **Intervention:** Physical Therapy interventions emphasized postural control re-training and functional skill training with application of three key intervention principles to remediate the PS, including: (1) recalibration of impaired internal reference of vertical through the use of external sensory and environmental cues, (2) forced-use of early upright

postural demands and balance training, and (3) forced-use of postural control demands in the context of task specific training and dual tasks. Systematic withdrawal of external cues and progression of task demands were demonstrated in this case report. Outcome measures implemented to monitor recovery in IPR were: a) The Scale for Contraversive Pushing (SCP) to assess change in pushing behavior, b) The Function in Sitting Test (FIST) to assess sitting balance recovery, and c) Functional Independence Measure (FIM) to assess level of functional independence. **OUTCOMES:** The patient demonstrated notable improvements in postural control, sitting/standing function, and functional mobility skills following an eight week stay in IPR. A significant reduction in pushing behavior was evident based on SCP, with a 70% improvement at discharge (d/c) (adm= 5.75, d/c= 1.5/6 pts). DS had a 34% improvement in the FIST (adm= 28, d/c= 47/56 pts), reflecting significant gains in sitting balance. Most notably, she had a FIM gain of 44 points (adm=23, d/c= 67/126 pts), requiring only minimal assist for majority of functional skills except locomotion and dressing. **DISCUSSION:** Patients with PS are responsive to intensive rehabilitation including use of external environmental cues, postural control re-training, and task specific practice. PS needs to be objectively diagnosed and measured throughout rehabilitation in order to determine effectiveness of intervention strategies. It is important for therapists to advocate for patients with this clinical problem, as PS may contribute to delayed functional gains but these patients have potential for functional recovery.

DPT Research Day Abstract: Systematic Review

THE EFFECTIVENESS OF CURRENT NON-PHARMACOLOGICAL INTERVENTIONS IN THE TREATMENT OF ANTERIOR CANAL BENIGN PAROXYSMAL POSITIONAL VERTIGO: A SYSTEMATIC REVIEW. Crouch N, Strace C, Kinne B; Grand Valley State University, Grand Rapids, MI.

INTRODUCTION: Benign paroxysmal positional vertigo (BPPV) is a peripheral vestibular dysfunction that causes bouts of vertigo and nystagmus elicited by particular head movements. One type of BPPV, anterior canal BPPV (AC-BPPV), was initially described in 1987. AC-BPPV, which accounts for an estimated frequency of 1% to 11% of all cases, is characterized by a latency period, a short duration, fatigability, and downbeating-torsional nystagmus. The purpose of this systematic review was to evaluate the effectiveness of current non-pharmacological interventions in alleviating the vertigo and/or nystagmus associated with AC-BPPV. **METHODS:** A literature search in the Cumulative Index to Nursing and Allied Health Literature (CINAHL) Plus with Full-Text, MEDLINE, and ProQuest Medical Library databases was conducted using the search terms "positional vertigo" or "positional nystagmus" or "positioning vertigo" or "positioning nystagmus" and "anterior canal" or "superior canal." Inclusion criteria for the systematic review were as follows: (1) individuals diagnosed with AC-BPPV, (2) unilateral canal involvement, (3) non-pharmacological interventions specifically designed for AC-BPPV, and (4) all studies except those that used mechanism-based reasoning. The evidence level for each included study was evaluated using the 2011 Oxford Centre for Evidenced-Based Medicine Guide. The methodological rigor of each included study was evaluated using a scale adapted from Medlicott and Harris. **RESULTS:** Three hundred forty-two records were identified through an electronic database search. Seven of these articles met the inclusion criteria and were included in the qualitative synthesis. Five out of the seven included studies used the resolution of vertigo and nystagmus as their desired outcome response. Two of these studies reported a resolution rate of 100% after two treatments. Two out of the seven included studies used the resolution of vertigo only as their desired outcome response. One of these studies reported a resolution rate of 98% after two treatments. This result was significant, because this study had the

largest number of subjects in the qualitative synthesis. **DISCUSSION:** Of the seven included studies, the interventions by Yacovino et al., Korres et al., and Rahko appeared to be the best methods for alleviating the vertigo and/or nystagmus associated with AC-BPPV. Each of these studies demonstrated high resolution rates, could be easily replicated, and did not require the use of any specialized equipment. **CONCLUSION:** Finding interventions for AC-BPPV is important, because BPPV can be a severe disabling problem that may lead patients to purposely avoid specific head movements. Additionally, patients with BPPV often experience loneliness, depression, a greater incidence of falls, and the inability to complete activities of daily living. This systematic review revealed seven particle repositioning maneuvers that were specifically developed for the treatment of AC-BPPV. Three of these maneuvers appeared to successfully alleviate the vertigo and/or nystagmus associated with AC-BPPV.

WRITING TIPS

If writing has been problematic for you, you may wish to seek assistance for writing your research. You may choose to do this by independent reading (see references) or by using the Writing Center here on the GVSU campus. It is your responsibility to seek out the help you need as soon as problems are identified.

Writing assistance is now available at the **GVSU Fred Meijer Center for Writing and Michigan Authors**, with writing center consultation sites at both the Allendale campus (Mary Idema Pew Library) and the DeVos (Steelcase Library) campuses as well as CHS 100: Student Academic Success Center. Visit gvsu.edu/WC or call the Writing Center at 331-2922 for drop-in hours or to schedule an appointment. You may also consult the writing center remotely via GoogleDocs. The tutors can help with anything from brainstorming and organizing through the finishing of papers. Any undergraduate or graduate student is welcome to get help with assignments for any class.

Part II
RESEARCH DESIGN

RESEARCH OPTIONS AND SEQUENCE
FOR THE PHYSICAL THERAPY PROGRAM

The following represent the research options open to physical therapy students under the PT 512, PT 610, PT 790, and PT 793 course sequence:

1. **Research Project** – student groups of three, with faculty mentor guidance, will participate in the planning, execution, analysis, and/or reporting of a research project. The aspects of the project a student group is required to complete is at the discretion of the faculty principal investigator. Not all projects will be started de novo and completed by a single student group. Some projects span several years and incorporate several student groups. However, regardless of which aspect of a project in which a student group is involved, each student group will be required to thoroughly review the literature and demonstrate a strong knowledge, and understanding of the theoretical and empirical underpinnings of the project. All students will be required to complete a final written product and a final defense of the project, as well as disseminate the research findings at Annual DPT Research Day in July of their last semester of the DPT program.

2. **Case Report** -Individual students choosing this option will follow the guidelines as described in research handbook. For the final defense the case report must be written in a journal-specific format, i.e., ready for submission. Students will receive guidance from their faculty (case report) mentor as to the selection of the most appropriate journal format. All students are required to disseminate case report in oral or poster presentation at Annual DPT Research Day in July of their last semester of the DPT program.

3. **Systematic Review** – student groups of three, with faculty mentor guidance, will complete a systematic review of the literature to answer a specific research question. All students are required to disseminate systematic review findings in oral or poster presentation at Annual DPT Research Day in July of their last semester of the DPT program.

Described below is the entire research course sequence.

Year I

Fall – The research handbook is required for first year students; research is introduced in PT 512 (Introduction to Health professions Research {1 credit}). Students learn how to critique the literature and synthesize the literature in the form of concise literature reviews; in their other courses they should continue to refine their skills in writing abstracts (abstract writing activities will be continued throughout the rest of the curriculum). The concept of evidence-based practice will be reviewed with an emphasis on understanding the link between practice and clinical research. The PICO process will be introduced and used to learn how to ask and answer clinically relevant questions.

Winter – Students are required to write several abstracts of current literature related to orthopedic physical therapy as a way to introduce them to being consumers of the literature, learn scientific writing skills, etc.

Summer – STA 610 (Applied Statistics for Health Professions). Project-oriented overview of major statistical techniques commonly used in problems encountered in rehabilitation. Students will learn to use SPSS as a research tool for data analysis and graphical representation of research findings.

Year II

Fall – PT 610 Research in Health Professions (2 credits)

a. All students learn all aspects of research design, including single case design, case report design, qualitative research, etc. Students will learn to critically review published research studies with varied research design, case reports and systematic review across clinical practice areas.
b. Students electing to do a research project will begin to form their research groups, formulate research ideas in collaboration with faculty mentor, and begin the process of working with a faculty mentor on faculty-directed project. Students will complete a systematic literature review.
c. Students who elect a case report option will be required to do a preliminary case report as part of the January clinical rotation (PT 656) and will need to make some initial preparation for this as part of fall semester. The expected outcome for PT 610 will be a literature review related to clinical questions that might be investigated during the January clinical rotation.
d. Students electing to do a systematic review will form their work groups and begin to work with their faculty mentor on a focused clinical research topic and literature review.

Winter – PT 790 (1 credit)

Student groups, who began to formulate research questions in the fall for a systematic review or research project will continue to refine and develop their proposal under the direction of their research mentor. Students participating in a research project already underway will complete the literature review and prepare to actively participate in the appropriate phase of the research project. Students electing the case option will have collected data during their second clinical rotation (January) and will be required to write a manuscript placed on the preliminary case report by the end of the term. Students electing the case report option will work in small groups, with faculty guidance, discussing cases and providing peer review.

Summer – PT 790 (1 credit)

a. Students who elected a systematic review or de novo research project will finish proposal, defend proposal, submit to the Institutional Review Board (IRB) (if appropriate) and begin data collection. Students participating in a research project already underway will defend their literature review and demonstrate knowledge and competence of all aspects of the project in which they will be participating.

b. Students electing the case report option will orally present their preliminary case report to faculty and students. Following satisfactory completion of the case report (written and oral portions) students will formulate another clinical question, begin literature review, contact clinical sites in advance in order to identify possibilities for their final case, etc. Students will be encouraged to contact both clinical sites for potential cases that they will be interested in pursuing.

Year III

Fall –

a. Students who elected a systematic review or research project will be in different stages of project development or data collection.
b. Students who elected a case report will be collecting data, finalizing literature review and begin to write their manuscript. Students will need to be in close communication with their faculty advisor during this time period.

Winter – PT 793 (3 credits)

a. Students who elected a systematic review or research project will finish data collection, complete the final written product and do a final oral defense. Students participating in a research project already underway will complete the project, final oral defense, and final written product. Students who are initiating a project that will be ongoing will complete a preliminary analysis of findings or appropriate written product as directed by the faculty principle investigator.
b. Students who elected the case report option will write the manuscript in final journal-ready publication format and do a final oral defense.

Summer –

a. All students will prepare and deliver a platform or poster presentation during the GVSU DPT Research Day. All students will be encouraged to submit abstracts for platform or poster presentations to MPTA for fall annual conference (see Appendix L for guidelines), or other state, regional, national conferences.

RESEARCH BID PROCESS

Research engagement is a collaborative process between PT faculty members and students. Student research groups are matched with faculty research advisors during the Fall semester of their 2nd year. The process begins with an all class meeting where faculty present their research agenda. Student groups will then have a two week discovery period to meet individually with faculty members to discuss specific research questions, project options, and specific phases of ongoing faculty research. Student groups submit their top three choices in ranked order along with a brief rationale to the DPT research committee at the conclusion of the discovery period. This marks the beginning of the first round of bidding during which time faculty will meet to collectively discuss student groups and notify students of their selections. The second round of bidding will then be open for students who were not matched with a faculty research advisor during the first round of bidding. In the second round of bidding, students will have the opportunity to switch from a group project to a case report or vice versa. Generally, all students are matched with faculty advisors within two rounds, but additional rounds are possible if necessary.

RESEARCH PROCESS GUIDELINES

Research Project (may be modified by faculty mentor if students picking up project already in process**)**

- By the end of the winter semester of the second year, the student(s) complete the introduction, literature review, and methods.
- By the end of the spring/summer semester of the second year, the student(s) complete the written product, as well as first oral presentation (proposal defense) as required for PT 790 (see grading rubric guidelines in research handbook).
- Student(s) then submit their proposal to the Human Research Review Committee and begin data collection once study approved by HRRC. {NOTE: Research proposal must go through oral defense and research mentor/s approval process prior to submission to HRRC}
- During winter semester of the third year, the student(s) complete data collection and begin data analysis.
- By the end of the winter semester of the third year, the student(s) complete the data analysis, results, discussion, and conclusion; and then complete second oral presentation (final defense) with final written product as required for PT 793 (see Appendix D).

Case Report

- During PT 656 in the winter semester of the second year, the student collects appropriate information and data for first case report.
- By the end of the spring/summer semester of the second year, the student completes the written and oral presentation of first case report as required for PT 790 (see grading rubric guidelines in research handbook).
- During either PT 675 or PT 677 in the fall semester of the third year, the student collects appropriate information for second case report as well as completes a literature review to support the case report.
- By the end of the winter semester of the third year, the student completes the final written and oral presentation of second case report as required for PT 793 (see Appendix D).

Systematic Review

- By the end of the winter semester of the second year, the student(s) complete the introduction and literature background.
- By the end of the spring/summer semester of the second year, the student(s) complete the methods and the first oral presentation with written product as required for PT 790 (see grading rubric guidelines in research handbook).
- By the end of the winter semester of the third year, the student(s) complete the results, discussion, and conclusion; and then complete second oral presentation with final written product as required for PT 793 (see Appendix D).

For All Three Options

- Students submit research project/case report/systematic review abstracts to the PT research committee by early June during the final semester of their third year.
- Student(s) disseminate research in the form of a professional presentation (platform or poster) at DPT Research Day in July (final semester).
- Refer to Research Handbook for scholarship/funding opportunities for research activities/budget (See Appendix E) and for poster printing (PT Department policy).

ROLES AND RESPONSIBILITIES

The research curriculum in the DPT program at GVSU provides students several options. The systematic review and research project options are faculty-led projects that are guided by the faculty mentor's knowledge, experience, and familiarity with the literature. While a single faculty member may lead a systematic review or research project, there may be a team of faculty members (within and external to the Physical Therapy Department) and/or community clinicians who bring additional expertise to the research team. However, the primary/lead faculty mentor must be a faculty member in the Physical Therapy Department.

The Physical Therapy faculty will present the available research study, systematic review, and case study options to students during the fall of the second year. Students will then have an opportunity to form groups if necessary and to explore the available options. Students will then complete a bidding process whereby students and faculty are matched with one another.

There are several important roles and responsibilities.

Student Responsibilities

1. Identify specific timelines by semester as described by programs.
2. Submit all drafts of written products to the primary faculty mentor for review (allow 10 days for review and feedback) and coordinate with collaborating faculty and clinicians as appropriate.
3. Schedule all research team meetings (time, room, equipment), allowing 10 days for feedback and ample time for corrections before scheduling proposal and final defense times/dates
4. Following research proposal defense and approval from faculty research team, submit for approval from Human Subject Review Committee (GVSU) before collecting any data if appropriate.
5. Remember to ascertain approval requirements from external involved institutions.
6. Follow the schedule for completion of the systematic review, research project, or case report.
7. Plan minimum submissions of 3 drafts and 10 day turn-around time for each submission when planning proposal defense, final defense and graduation.
8. Provide copies of final written product to faculty and clinical research team members, and to the library (GVSU Frey Library).
9. Provide a copy of the library receipt to the Physical Therapy department chair.

Faculty Mentor Responsibilities

<u>For PT 790</u>

1. Provide primary guidance to student in completion of proposal
2. Facilitate selection of research team members if appropriate.
3. Clearly establish expectations of additional student roles and responsibilities specific to the systematic review, research project, or case study.
4. Clearly establish expectations for the oral and written products required for successful completion of PT 790 and 793. This is especially important for research projects ongoing research projects.
5. Provide primary guidance in completion of systematic review, research project, or case study.
6. Provide feedback to student(s) within 10 days of receiving a written draf.t
7. Guide students' preparation for proposal defense or first case study public presentation.

8. Review and discuss authorship guidelines (see guidelines provided by the Center for Creative and Scholarly Excellence) as early as possible in the proposal process.
9. Serve as primary investigator of record for all IRB submissions.
10. Use evaluation form provided in the research handbook for grading the written manuscript and oral defense (use Grading Criteria for PT 790). It is the chair's responsibility to distribute a copy of the grading criteria to faculty/clinician research team (if applicable) and students.
11. Submit final research grade on GVSU Banner system.

<u>For PT 793</u>

1. Advertise the scheduled defense for a minimum of one (1) week before the defense date. Include the title of the project, names of the students, the time and location.
2. Guide students' preparation for final oral defense.
3. Facilitate discussion following oral presentation among research team/collaborators and students.
4. Facilitate discussion of students' evaluation, using the evaluation form provided in the research handbook for grading the written and oral defense (use Grading Criteria for PT 793). It is the chair's responsibility to distribute a copy of the grading criteria to the faculty/clinician research team (if applicable) and students.
5. Make final check of manuscript for content and format changes prior to signing and allowing students to make final copies for distribution.
6. Provide guidance on DPT Research Day presentation and feedback on platform or poster presentation.
7. Submit final grade for PT 793 to banner.
8. Review and discuss authorship agreement for possible submission of abstracts to state and national professional meetings or journal submission.

Faculty/Clinician Research Team/Collaborator Responsibilities

1. Provide guidance to verbal questions as posed by student(s) related to concepts and/or methods, etc.
2. Provide feedback to student(s) within 10 days of receiving a request for input written drafts.
3. Participate in review the oral defense of the proposal and final paper and provide written feedback.
4. Participate in the evaluation of the proposal by attending the initial proposal approval meeting and final defense.

DESIGNING THE STUDY

PT 610, and Parts II and III of Portney & Watkins (2009) should provide you with a basic background to design a research project.

In addition, GVSU faculty, outside the PT department, continue to show great enthusiasm for helping graduate students with research design, including statistics. However, while students will not be expected to actually perform complex statistical analysis, faculty expects students to take responsibility for the design of their project, to understand the statistical methods used and results obtained, and to be able to defend them.

Students should work as a collaborative team with their faculty mentor across all stages of the research design and data analysis process.

Suggested Readings

Quantitative Methodological References

Barlow DH, Hersen M. Single Case Experimental Designs: Strategies for Studying Behavior Change. 2nd ed. New York: Pergamon Press, 1984.

Daniel WW. Biostatistics: A Foundation for Analysis in the Health Sciences. 9th ed. New York: John Wiley & Sons; 2008

Domholdt E. Rehabilitation Research: Principles and Applications. 3rd ed. St. Louis, MO: Elseveir Saunders; 2005

Hurley WL, Denegar CR, Hertel J. Research Methods; A Framework for Evidence-Based Clinical Practice. Baltimore MD : Lippincott Williams and Wilkins 2011.

Johnson MV, Ottenbacher KJ, Reichardt CS. Strong quasi-experimental designs for research on the effectiveness of rehabilitation. Am J Phys Med Rehabil 1995; 74: 383-92

Keppel G, Wickens RD. Design and Analysis: A Researchers' Handbook. 4th ed. Upper Saddle River, JN: Prentice-Hall; 2004

Munro BH. Statistical Methods for Health Care Research. 4th ed. Philadephia PA: Lippincott Williams & Wilkins, 2001.

Portney LG, Watkins MP (eds): Foundations for Clinical Research: Application to Practice, 4th ed, 2009; Prentice Hall.

Rothstein, J. & Echternach, J. (1993). Primer on Measurement: An Introductory Guide to Measurement Issues. Alexandria: APTA.

Sackett DL, Wennberg JE. Choosing the best research design for each question. BMJ 1997; 315: 1636.

Qualitative Methodological References

Bogdan, R.C. and Biklen, S.K. (1992). Qualitative Research for Education: An Introduction to Theory and Methods. Boston: Allyn & Bacon.

Creswell JH. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. 2nd ed. Thousand Oaks, CA: Sage Publications, Inc; 2003

Creswell JW. Qualitative Inquiry and Research Design. Choosing Among Five Traditions. Thousand Oaks, CA: Sage Publications; 1998

Dengin, N.K. and Lincoln Y. (1995) Handbook of Qualitative Research. Newbury Park, CA: Sage.

DiCicco-Bloom, B & Crabtree, B. The qualitative research interview. Medical Education. 2006; 40:314-321

Henderson R, Rheault W. Appraising and incorporating qualitative research in evidence-based practice. *J Phys Ther Educ.* 2004; 18;(3):35-40.

Hesse-Biber, S.& Leavy, P. (2011) The practice of qualitative research. Los Angeles, CA: Sage Publications

Hurley WL, Denegar CR, Hertel J. Research Methods; A Framework for Evidence-Based Clinical Practice. Lippincott Williams and Wilkins 2011, Baltimore MD

Merriam, Sharon B. (1991). Case Study Research in Education: A Qualitative Approach. Newbury Park, CA: Sage.

McDowell I, Newell C. Measuring Health: A Guide to Rating Scales and Questionnaires. 2nd ed. New York: Oxford University Press; 1996.

Morgan, D.L. (Ed.). (1993). Successful Focus Groups. Newbury Park, CA: Sage.

Starks, H & Trinidad, S.B. (2007). Choose your method: a comparison of phenomenology, discourse analysis, and grounded theory. Qualitative Health Research, 17, 1272.

Yin RK. Case Study Research: Design and Methods. 2nd ed. Thousand Oaks, CA: Sage Publications; 1994.

RESEARCH PROJECT PROPOSAL CONTENT - PT 790

See Portney & Watkins (2009), Chapter 32 for general information about the research proposal.

The format for the research project proposal is at the discretion of the faculty research advisor, but generally contains the information outlined below. The difference between a "chapter" format (outlined below) and "journal-ready" format is length and depth of information presented. The format preference of the research advisor will depend on the nature, phase, and dissemination objectives of the project.

The research proposal may include one or more of the following sections and headings, including chapter headings and secondary headings. Additional subheadings, 3rd level, 4th level, etc. may or may not be needed. See Appendix A for additional information on formatting headings.

Title Page

Definition of Terminology

Chapter 1 INTRODUCTION

Background to Problem or context
Problem Statement
Purpose/Aims
Significance of the Problem – to your profession and/or the health care system
Hypothesis/research questions/objectives or research questions

Chapter 2 REVIEW OF LITERATURE AND CONCEPTUAL FRAMEWORK

Review of literature: Evaluation and synthesis of the literature including strengths and weakness of existing literature and gaps or omissions.

Reliability /Validity or trustworthiness of their specific procedures/tests or measurement procedures that relate directly to the investigation of this problem when 1) they are not widely used or accepted, 2) their reliability and/or validity is in question and it may impact the data collection and analysis, 3) the instrument is not widely used or accepted or 4) different tests or measurement techniques are available and the inter and intratester reliability and validity of each varies then the pros and cons of each need to be presented.

Summary and Implications for the Study

Chapter 3 METHODOLOGY:

Study Design and sequence of the investigation. Describe in detail. Indicate any problems that you anticipate and how you plan to deal with them. **Briefly** discuss the advantages of the methodology which you have selected.

Study site and subjects – include agency approval, description of, intended characteristics of the sample, including any inclusion and/or exclusion criteria. Any form used to assess inclusion and/or exclusion criteria should appear in the appendix. Describe the study site and facilities available for the study. Explain how subject confidentiality will be protected.

Population – Describe in detail the population and sample and the selection method.

Equipment and Instruments – All instruments and equipment used in the study need to be described in detail. Identify the measurement tools*, their origin, psychometric properties, and how they will be used in the study. Examples of questionnaire type instruments should be included as an appendix. Include a sample of all instruments used.

Validity/Reliability of specific procedures/tests*. Trustworthiness is addressed here for qualitative research.

Procedures – Describe the data collection procedures including types of data to be collected: when, how, and by whom. Place copy (ies) of data collection forms in the appendix. Describe the intervention, if applicable. Provide details of protection of subjects and any potential hazards. Include a copy of the consent form and the exact description of instruction for subjects in the appendix.

Data Analysis - describe the plan for preparation and analysis of data.

Limitations - describe the limitations that you foresee arising from your study design, procedure, sample population, etc.

References

Appendices:

1. Informed Consent Form (if applicable)
2. Data Collection Forms, questionnaires, detailed apparatus description, inclusion and/or exclusion criteria forms, recruitment materials etc.
3. Proposal Summary for Human Subject Review Committee (if applicable)
4. Budget Summary (if appropriate)

*Measurement instruments and/or procedures/tests that are widely accepted and used and that have proven to be reliable and valid need only a brief comment with reference as to their intra and/or inter-tester reliability and validity and do not need to be discussed in Chapter 2. If one measurement instrument or piece of equipment was selected from among several possible alternatives your rationale should briefly be included. Various alternatives and their pros & cons should be described in Chapter 2.

FINAL RESEARCH PRODUCT-PT 793

See Portney & Watkins (2009), Chapter 33, for general information about reporting research results.

The format for the research project proposal is at the discretion of the faculty research advisor, but generally contains the information outlined below. (For formatting refer to Appendix A) The difference between a "chapter" format (outlined below) and "journal-ready" format is length and depth of information presented. The format preference of the research advisor will depend on the nature, phase, and dissemination objectives of the project.

The final document may include one of more of the following sections and headings including chapter headings and secondary headings. Additional subheadings, 3rd level, 4th level, etc. may or may not be needed. See Appendix A. Faculty may negotiate with students to format final manuscript in journal-ready form.

Title Page
Abstract
Acknowledgments
Preface - Definition of Terms (optional)
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List of Tables
List of Figures
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- Problem Statement
- Purpose/Aims
- Significance of the Problem – to your profession &/or the health care system

Chapter 2 REVIEW OF LITERATURE AND CONCEPTUAL FRAMEWORK
- Review of literature: Evaluation and synthesis of the literature including strengths and weakness of existing literature and gaps or omissions. Reliability/Validity or Trustworthiness of their specific procedures/tests or measurement procedures that relate directly to the investigation of this problem when 1) they are not widely used or accepted, 2) their reliability and/or validity is in question and it may impact the data collection and analysis, 3) the instrument is not widely used or accepted or 4) different tests or measurement techniques are available and the inter and intratester reliability and validity of each varies then the pros and cons of each need to be presented.
- Summary and Implications for the Study

Chapter 3 METHODOLOGY
- Study Design and sequence of the investigation. Describe in detail. **Briefly** discuss the advantages of the methodology which you have selected.
- Study Site and Population – location of study, description of the characteristics of the sample, including any inclusion and/or exclusion criteria. Any form used to assess inclusion and/or exclusion criteria should appear in the appendix. Describe characteristics of the population and sample. Describe selection methods.
- Equipment and Instruments – All instruments and equipment used in the study need to be mentioned. Identify the measurement tools*, their origin, reliability and

validity and how they will be used in the study. Examples of questionnaire type instruments should be included as an appendix.

Validity/Reliability* of specific procedures/tests. Trustworthiness is addressed here for qualitative research.

Procedure - Indicate how subjects were recruited. Describe the data collection procedure including types of data collected: when, how, and by whom. Place copy (ies) of data collection forms in the appendix. Describe the intervention, if applicable. Provide details of protection of subjects and any potential hazards. Include a copy of the consent form and the exact description of instruction for subjects in the appendix.

Chapter 4 RESULTS/DATA ANALYSIS

Techniques of data analysis

Characteristics of subjects^*

Report results under appropriate subheadings

Other findings of interest

Chapter 5 DISCUSSION AND CONCLUSIONS

Discussion of findings – restate purpose and/or hypothesis for readers benefit

Application of practice/administration/education

Limitations

Suggestions for further research/modifications

Conclusion/Summary – include relevance to your profession

References

Appendices

1. Informed Consent Form (if applicable)
2. Data Collection Forms, questionnaires, detailed apparatus description, inclusion and/or exclusion criteria forms, etc.

*****Validity/Reliability: Measurement instruments and/or procedures/tests that are widely accepted and used and that have proven to be reliable and valid need only a brief comment with reference as to their intra and/or intratester reliability and validity and do not need to be discussed in Chapter 2. If one measurement instrument or piece of equipment was selected from among several possible alternatives your rationale should briefly be included. Various alternatives and their pros & cons should be described in Chapter 2.

^*****Placement of data related to subjects might be included in either Chapter 3 or 4. This should be determined in discussion with your committee. Generally it is appropriate to include it in Chapter 3 unless the demographics are directly related to hypothesis testing, in which case they should be included in Chapter 4.

Final copies should delete future tense and go to past tense.

****The library requires one of the following titles: **Doctor of Physical Therapy Case Report**, **Doctor of Physical Therapy Systematic Review**, or **Doctor of Physical Therapy Research Project**. An electronic copy of projects should be submitted to department prior to graduation and may be used in the University repository of faculty and student work.

PROPOSAL APPROVAL PROCESS

The Approval Process involves an Oral Proposal Defense that consists of two parts: 1) a brief presentation of your study, and 2) questioning by your research mentor and collaborators.

Oral Presentation of Proposed Project

In the first part, the Approval Process provides you with the opportunity to orally summarize your research project for your committee. ***This presentation must be scheduled when all research team members can attend.*** You should prepare a 20-30 minute overview presentation of your project.

Defense/Questioning

In the second part, your research mentor will guide a session for questions that are intended to probe your comprehension of the material that you presented. The faculty and/or clinician research team will expect you to understand and explain all of the aspects associated with your responsibility in the study.

Grading

Your grade for the proposal defense phase (PT 790) will be based upon the oral presentation and the paper submitted at the time of the Defense. Please see Appendix D for details about grading and the associated scoring rubrics. There may be additional revisions to the proposal following the defense to ensure it is of sufficient quality prior to submission for HRRC approval if appropriate to the nature of the proposed work. **A grade for PT 790 will not be issued until the required revisions are completed.**

PLEASE NOTE: Students must schedule a time and location where the Proposal Approval Process will take place when your research mentor feels your research project is ready to defend. Be sure that all faculty research team members have a minimum of one week to read your research project before your defense date. All faculty and student research team members must be able to attend the scheduled defense.

CHS classrooms or conference rooms: please contact Sarah Kozminski 331-2681, kozminsa@gvsu.edu

THE FINAL DEFENSE

The Final Defense process consists of two parts: 1) a brief presentation of your study, and 2) questioning by your committee.

Oral Presentation

In the first part, the Defense provides you with the opportunity to orally summarize your research project for your committee***. This Defense must be scheduled when faculty mentor and all research team members can attend.*** You will be expected to provide a presentation (20-45 minutes, at the discretion of faculty mentor) of the project.

Questioning

In the second part, the research mentor and advisory team will guide a session for questions that are intended to probe your comprehension of the material that you presented. Student researchers will be expected to understand and explain all of the aspects associated with your responsibility in the study. You will also be asked to clarify specific points in the written text as needed and make recommendations for further research.

Grading

Your grade for the final defense phase (PT 793) will be based upon the oral presentation and the paper submitted at the time of the Defense. Please see Appendix D for details about grading and the associated scoring rubrics. There will likely be additional revisions to the final paper following the defense to ensure it is of sufficient quality prior to submission to the library. **A grade for PT 793 will not be issued until the required revisions are completed and the final copy of the paper is submitted to the Library**.

PLEASE NOTE: Students must schedule a time and location where the Defense will take place when your research mentor feels your research project is ready to defend. Be sure that all research team members (faculty/clinicians) have a minimum of one week to read your research project before your defense date. Students are responsible for assembling the committee. All research team members must be able to attend the scheduled defense.

CHS classrooms or conference rooms: please contact Sarah Kozminski 331-2681; kozminsa@gvsu.edu

PRESENTATIONS OF RESEARCH

Each year the graduating class presents their research to the Grand Valley State University and to the west Michigan community at the DPT Research Day, as well as at the Professional communities in southwestern Michigan through the Medical Education Research Consortium (MERC). The purpose for these formal events is two-fold: (1) to provide a forum to acquaint the named audiences with the work being done by DPT students, and (2) to facilitate the student's ability to present a research project to a critical audience. This, we believe, will prepare the students to be able to present at conferences and professional meetings. See Appendix G for guidelines on presentations.

GVSU DPT Research Day (required)

The DPT Research Day is held in July during the week prior to the DPT graduation ceremony. Students present their work to their fellow students, the faculty, and others from the GVSU and clinical community.

During these platform and poster presentations and any other subsequent presentation of your work you should give due recognition to your faculty mentor (He/she should have authorship on the presentation. See Policy on Authorship in this handbook as well as guidelines posted on Center for Creative and Scholarly Excellence.) and to the GVSU Program. This will not only give recognition to our faculty and program but also help raise the stature of our programs and the degree that you earned at this university.

For DPT Research Day Abstracts: *Authorship order should be students' names first followed by faculty mentor(s) names.*

If dissemination occurs outside of the research day presentation (at state or national level), *the author order will be at the faculty mentor's discretion and will follow acceptable guidelines for authorship.*

Medical Education Research Consortium (MERC) Research Day (optional)

The MERC research day takes place in Grand Rapids and includes medical residents, clinical nurses, graduate nursing students and students from the PT, OT, and PAS programs at GVSU. This usually takes place in April, during the student's 3rd year in the DPT program. The audience is typically faculty from MSU, GVSU and clinical faculty from area hospitals. This presentation may be platform or poster in nature.

Michigan Physical Therapy Association Annual Fall Conference (optional)

Students are encouraged and mentored by faculty mentor to submit their abstract of research project, systematic review or case report to MPTA for poster or platform presentation at Annual Fall State conference.

PREPARING FOR PUBLICATION

Students should strive for a quality in their work suitable for publication. The faculty encourage students to submit a summary of their work for publication for a variety of reasons: 1) one of the purposes of research is to address pertinent educational and clinical questions and share the answers with the rest of the world; 2) publication is the ultimate culmination of the effort put forth by the researcher(s); and 3) it could provide an avenue for faculty to collaborate with students on publications.

The first step in preparing to submit for publication is to select the most appropriate journal for your manuscript. Peer-reviewed journals should be considered first. The editor of a peer-reviewed journal will send your manuscript to one or two experts in the area you have researched. For sure, your submission will receive a critical review. Your first submission may even be rejected. But the comments you will receive should permit you to produce a superior product. You will always be encouraged to re-submit. Peer-reviewed journals generally publish the higher quality work. Next, you want a journal that tends to publish papers related to the type of research you have completed. For example, it would not take sense to submit a paper on clinical education issues to **The Journal of Orthopaedic and Sports Physical Therapy**. Finally, you should consider a journal that would most likely publish a manuscript summarizing your research. In other words, be realistic about the journal you submit.

After you have selected the journal you wish to submit to you will need to tailor your manuscript according to the general editorial style adopted by that journal. For researchers in psychology the **Publication Manual of the American Psychological Association** provides the guidelines for publication. Many other journals also use the APA format. Submissions to journals within the American Physical Therapy Association (including the section journals or quarterlies) must subscribe to the guidelines published by the **American Medical Association**. However, each journal will have a section titled "Instructions to Authors" which should be consulted for specific guidelines (see following page for an example). Read these instructions carefully and follow this exactly.

By now you have all had numerous opportunities to read and review journal articles. Essentially, your proposed journal manuscripts will be a scaled-down version of your thesis. Journal articles, preceded by an abstract, include an introduction and purpose, followed by a brief review of the literature, description of methods, results and a discussion/conclusion section. Yes, it would entail another re-write, but all of the hard work has already been done. Your faculty mentor may offer to assist you at this stage.

The process, as you know, is long, but the final outcome will be worth the effort.

POLICY ON AUTHORSHIP

Research activity and other scholarly work is expected of faculty in the College of Health Professions at Grand Valley State University. Faculty members are expected to responsibly conduct their activities with the highest degree of integrity. Professional competence and expertise, as well as decisions regarding contract renewal, salary, tenure, and promotion, are partially based on scholarly/research productivity and subsequent publication of scholarly work. Scholarly activity may be pursued independently or in collaboration with peers and/or students. In collaborative research endeavors, authorship credit and order are important matters.

In making authorship decisions, faculty, colleagues, and students should consider the following steps:

1. Early in the collaborative effort, colleagues discuss how authorship questions are made, the nature of professional contributions to professional publications, the meaning of authorship credit and order, and the importance of parties agreeing on what contributions will be expected of each collaborator for a given level of authorship credit.

2. Collaborators should assess the abilities of all parties, the tasks required to complete the scholarly publication, the extent of supervision required (if appropriate), and appropriate expectations for what each collaborator can reasonably contribute to the project.

3. On the basis of #2, parties should discuss and agree on what tasks, contributions, and efforts are required of all parties to warrant authorship and to determine the order of authorship. An arbitrator may be sought if parties are unable to agree.

4. Agreements regarding authorship credit and order may need to be renegotiated prior to final manuscript submission.

5. The order of authors' names on a publication or presentation should reflect the relative strength of their contributions to the project. If there were equal contributions names should be listed alphabetically (the rationale for this should be stated so in a footnote; for student research projects the footnote will be placed on the acknowledgment page of the final manuscript).

The policy of the College of Health Professionals with regard to authorship will follow what was published by the International Committee of Medical Journal Editors (*JAMA*, 1997;277:927-934), and used by the Editorial Office of *Physical Therapy*:

> All people listed as authors should have participated sufficiently in the work to take public responsibility for the content. Authorship credit should be based on substantial contributions to (1) conception and design, or analysis and interpretation of data; (2) drafting the article or revising it critically for important intellectual content; and on (3) final approval of the version to be published. Conditions (1), (2), and (3) must **all** be met.

With regard to collaborative efforts that do not meet the above criteria, acknowledgment may be appropriate when the following activities occur:

1. Providing an initial research idea without any of the subsequent development of the project.

2. Provision of technical support for the project such as typing, data collection, data entry, construction of devices designed by someone else, etc.

3. Provision of resources such as space, money, equipment or supplies.

4. Having supervisory responsibility over an investigator who is an employee or student.

Refer also to authorship guidelines posted on GVSU website: Center for Creative and Scholarly Excellence

APPENDIX A

Formatting the Project

REQUIREMENTS TO FOLLOW

There are three sources of requirements that students may follow: 1) GVSU chapter format requirements, or 2) American Psychological Association (APA) or American Medical Association (AMA) requirements for journal-ready manuscripts. Cover and title pages/must follow the University Library requirements.

Grammatical style, references, footnotes, bibliography, tables, etc. for the DPT research project, systematic reviews, and case reports are acceptable in either AMA or APA style, however, students must have their choice approved by their research mentor. Students can purchase the APA or AMA Publication Manual at the GVSU Bookstore; or online resources available through GVSU library.

Under the direction of research mentor, the research team may elect to follow a specific journal format requirement and submit to GVSU library in manuscript-ready format.

In addition, **the University Library maintains its own requirements for reproduction and binding of final copies.** Students should obtain the guidelines from the library for cover page and binding instructions (especially left side margins) as soon as they are prepared to compile final research manuscript.

Please note margin requirements before you begin to type your manuscript. Margin requirements are very specific, to accommodate the required binding process at Mini Print. GVSU format adheres to those requirements.

The research mentor will ascertain that the manuscript is edited for spelling, grammar, organization, stylistic consistency, and correct sequence of pages. However, the Department Chair makes the final determination of whether to accept the final manuscript.

The following pages provide guidance on the chapter format guidelines.

ORGANIZATION

The research manuscript falls into three main parts or divisions: the preliminary pages, the text, and the reference material. Parts of some of these sections are optional, but the order, regardless of what parts may be left out, is as follows:

ORDER	PAGINATION	
Title/Signature page (see Appendix G for formatting)	none	
Abstract	i	
Dedication, acknowledgments, preface (optional)		Lower
Table of Contents (see sample)		
Case		
List of Tables		
Roman Numerals		
List of Figures		
List of Appendices (optional)	vii	
Text of paper, (1st. page of Chpt. 1 to last page of Chapter 5)	1	Arabic
References or Bibliography		
Numerals		
Appendix/ces (optional)	76	

OTHER NOTES:
CHAPTER # and TITLE, all in capital letters, go at the beginning of each chapter. The first page of each of the five chapters has a top margin of 1.5 inches and pagination at bottom center.

PAGINATION

Preliminary pages: do not type a page number on the title page or the copyright page (if included). The abstract, dedication, acknowledgments, or preface page (if included) are numbered starting with ii at the bottom center of the page, and all following pages of preliminary material are numbered consecutively in lower case Roman numerals also at the bottom center of each page.

Text: page numbers are to be typed in the upper right corner or the top center of the page. In either case the number must be placed below the one-inch top margin line. No punctuation marks should appear before or after these numbers. The page number is placed at the bottom center on the first page of each chapter, the first page of the reference list and the first page of each appendix section.

Use Arabic number beginning with number 1 on the first page of the text and continuing throughout the rest of the manuscript, including the reference material and the appendix.

THE PRELIMINARY PAGES

(See Examples in Appendix K)

TITLE PAGE: The candidate's full name(s) must appear as it does on all records and transcripts. The year shown must be the year in which the degree is conferred. The major must be precisely that which is shown on the student's transcript. See sample title page in Appendix K.

ABSTRACT: The abstract is a succinct account of the dissertation containing a statement of the problem, procedure or methods, and conclusions. The abstract must be typewritten, double-spaced and formatting should follow the guidelines from Michigan Physical Therapy Association for abstract submission to Annual Fall Conference. See Appendix L for more details on MPTA abstract guidelines.

DEDICATION, ACKNOWLEDGEMENTS, PREFACE, OR FOREWORD: These items are optional and, if included, should appear on separate pages in the order shown. The dedication, as its name suggests, is a personal dedication of one's work. An acknowledgment is a brief note of appreciation for assistance given to the candidate in the research and preparation of the manuscript. A preface or foreword may contain the author's statement of the purpose of the study or special notes to the reader, such as definition of terms, list of abbreviations, etc. See examples in Appendix K.

TABLE OF CONTENTS: Each manuscript is to have a table of contents which shows the principle divisions of the work and the pages on which each may be found. List all of the preliminary pages you included except the title, copyright, and contents page(s). See example in Appendix K.

LISTS OF TABLES, FIGURES, OR ILLUSTRATIONS: When tables, figures, or charts have been placed in the body of the manuscript (not in the Appendix), separate lists must be included and should follow the Table of Contents page in the order indicated. Each entry on the list should carry the same caption or title as is shown on the corresponding figure in the text. See examples in Appendix K.

THE TEXT

The text is the main body of the manuscript. In it the problem is stated, the methods described, the results of the investigation are presented, analyzed and discussed, and the findings are summarized and interpreted. The detailed organization of the text will vary from subject to subject, but regardless of organization, the mode of presentation should be consistent throughout. See "Final Research Product – PT 793" for more specifics as to content.

Only major divisions or chapters should begin with a new page, and typists should make every effort to avoid having partially filled pages except at the end of a chapter. Even the last page of a chapter should have more than one line of textual material.

In many cases the main body of a manuscript will include materials other than ordinary text, such as illustrations, tables, figures, and formulae. In such cases, the following guidelines should be observed:

SUPPORTING MATERIALS

All supporting materials in the main text should, wherever possible, appear on the same page, immediately after the paragraph in which they are referenced, if space allows, or on next available page.

1. **ILLUSTRATIONS:** All illustrations used in the manuscript must appear in all copies. Illustrative material may be drawings, charts, maps, diagrams, photographs or photostats. Illustrations may be inserted wherever appropriate. However, as a general rule, they should appear after they have been mentioned in the text on the same page or next immediate page as space allows. Illustrations must be consecutively numbered throughout.

Large drawings, figures or photographs should be prepared on paper of the same size and weight as the rest of the manuscript and, ideally, should be designed so that the designated number and caption can be placed on the same page within the prescribed margins. If this is not possible, a page may be inserted between the text and the illustration and the caption typed on the blank page facing the illustration. In such a case, the page number must be placed in the upper left corner or top center of the page on which the caption appears. The page carrying such a caption should be left blank on the reverse side. Lettering and line-drawing which cannot be typewritten on illustrations should be inserted with India ink or a black carbon-base ink.

Lines on graphs or other differentiations should be identified by labels or symbols rather than colors. Similarly, shaded areas-such as countries on a map have better contrast if cross-hatching is used instead of color. Glossy prints do not microfilm well. It is better to have photographs xerographically reproduced or sprayed with a mat-finish chemical. Color photos should not be used in a thesis.

Illustrations larger than page size may be folded and mounted on another sheet (see example in Figure 1 below) or xerographically reduced. Illustrations smaller than page size should be mounted on the same paper that is used for the rest of the thesis or between lines of text and photocopied for inclusion into thesis. Page sized photographic reproductions may not be used; such reproductions must be mounted on regular paper with a 1 1/2" margin on the left side and photocopied.

2. **TABLES AND FIGURES:** It is essential that tables and figures be fully legible. Tables and figures larger than a half page should be placed on a separate page from the main text. Half-page or shorter tables/figures are placed on the same page immediately following the end of the paragraph in which it is first mentioned if there is enough room on the page. If there is insufficient space remaining on the page to insert the table or figure then it is placed on the very next page between paragraphs. The descriptive title for a table is placed above the table. For figures, the descriptive title is placed below the figure. Very large tables/figures may be foldouts as described for large illustrations or reduced via photocopy reduction to fit on one page. All tables/figures should be numbered consecutively throughout the manuscript. The type face and font size used in the tables may be different from that of the text.

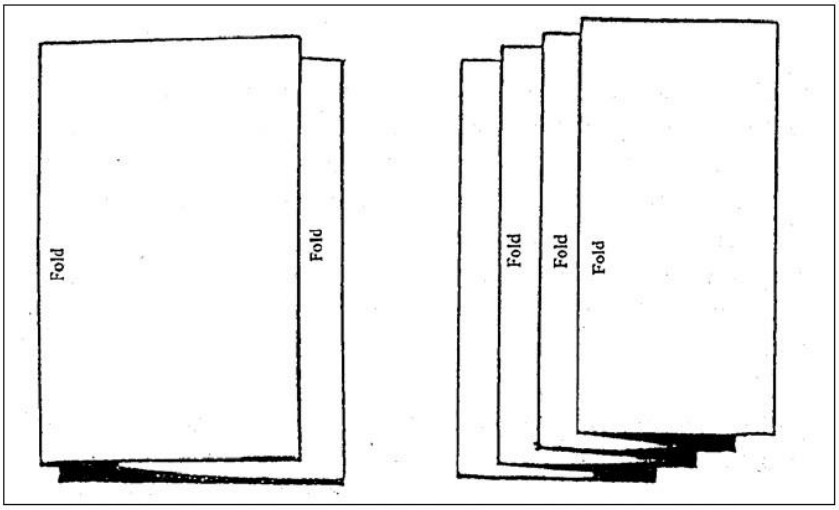

Figure 1: A horizontal graph or chart that is too wide may be folded, fan-wise, and mounted on a thesis page. The left edge should have a 1 ½" margin, and folds must clear the right margin.

3. **FORMULAE:** Mathematical and chemical formulae may be typed, hand lettered or both. Complex formulae of two or more lines should not be included in text lines, but should be centered between lines of text. The lines in structural chemical formulae and hand lettered mathematical formulae must be drawn with India ink or other black carbon-base ink.

4. **FOOTNOTES:** Notes documenting the text and corresponding to reference numbers in the text are called "footnotes" when they are printed at the foot of the pages, and "notes" when they are printed at the back of the manuscript or at the end of a chapter. Both are single-spaced, with a double space between each listing. If placed at the bottom of each page, the footnotes must be separated from the text by a partial line one space above the first line of footnotes. Arabic numbers should be used for footnotes and notes except in tabular or mathematical matter, in which case, to avoid confusion, asterisks or small letters should be used. If all the references are given at the end of a thesis, see information under "The Reference Material."

REFERENCES

NOTES, TEXTUAL REFERENCES, AND BIBLIOGRAPHIC SYSTEMS: Please consult the APA Manual or AMA Manual.

APPENDIX

In most research projects it is desirable to include certain materials, e.g. test forms, survey questionnaires, subject consent forms, data collection forms, detailed apparatus descriptions, tables of raw data, etc., which are not immediately essential to an understanding of the text. Such materials should be included in the Appendix. The Appendix may be divided into Appendix A, Appendix B, etc., depending on the kinds and amounts of material included. Each appendix may have its own cover sheet that should be included in the consecutive pagination. See Appendix X title page for an example.

Appendix material should have adequate left-hand margins for binding. Sheets larger than page size must be folded in the manner described for illustrations or reduced. Computer printouts and mimeographed materials are acceptable. If maps or other bulky materials are to be included in the Appendix they should be inserted in a 6 1/2" x 9 1/2" envelope which will be glued to the back cover by the bindery.

FINAL COPIES AND BINDING

Copies are made for GVSU library and for each of your research mentors. These copies must be bound using project wire or comb bound with black plastic front and back cover. **For the library copy refer to the GVSU Frey library handout material for their requirements on binding and Cover page.**

The research project, systematic review, or case report must be deposited on white 20-pound bond paper in one of the following forms:

1. High quality xerographic reproduction (glossy reproductions are not acceptable) or
2. Computer generated black (gray) & white. Do not use color printing.

Students who are uncertain as to the acceptability of the duplicating process being considered are advised to submit sample pages in advance to the department for an opinion.

TYPING MECHANICS

The research project, systematic review or case report must be typewritten in **Times New Roman** font, **size 12pt or Calibri 11pt** for all textual pages. All copies must be clean and all characters clearly legible. Inking must be uniform and of a relatively even blackness throughout the manuscript. There should be no smudges, no letters filled in or fallen out, and no smeared, shadowed or fuzzy type. All graphs or tables must be printed in shades of black and white. If your original graph is in color, select colors that will remain distinct when photocopied in black and white.

PAPER

For the final copies the paper must be white, of one kind throughout, of a weight not less than 20 pound bond, and of letter size - 8 1/2" x 11". Material included in the appendices need not conform (except in size) to these requirements.

MARGINS

The following margins must be maintained to facilitate binding or microfilming:
1.5 inches on the left, and 1.0 inch on the other three margins. **Narrower or wider margins are not acceptable** because they will interfere with the binding process. Other elements separated from the text, e.g. tables and graphs, must conform to the left margin and as closely as possible to the other margins but some variation is permissible. The first page of each chapter has a top margin of 1.5 inches and pagination at bottom center. No text, figures or tables are permitted to extend beyond these margins.

HEADINGS

1. Primary: Capitalized, Centered, Bold; Larger Size and top margin of 1.5" down.

CHAPTER 1
INTRODUCTION

2. Secondary: Centered in upper and lower case & underlined. Same size as text.

3. 3rd. Level: Centered in upper & lower case. Same size as text.

4. 4th. Level: Left justified in upper and lower case & underlined. Same size as text.

5. 5th. Level: Left justified in upper & lower case.

LINE SPACING

The body of the text must be double-spaced. The reference or bibliography section is single spaced within each reference, double-spaced between references. Quotations in the text exceeding four lines are single-spaced indented Captions for tables and figures are also single-spaced. When text appears before or after a table or figure a triple space should be used. For line spacing in the Table of Contents, List of Tables, List of Figures and List of Appendices see examples in Appendix K.

PROOFREADING

Someone other than the person who wrote the final form of the manuscript should carefully proofread and corrections should be made before it is delivered to the Program/Department Chair. The sequence of pages and table of contents should also be carefully checked.