MAT-S College of Natural Sciences and Mathematics
Writing Assignment Policy

Purpose:
The two purposes of the Semester Project Writing Assignment are to
- insure that candidates can communicate clearly and logically in formal academic
prose that is in accordance with American Psychological Association standards for
style.
- provide data for the purposes of program evaluation and improvement.

A similar writing assignment is required of all graduate programs in the College of
Education.

Process:
- The three core courses in the MAT-S program, SCED 550, 552, and 554, have been
identified as the courses in which students complete a writing assignment. The semester
project is the culminating assignment in each of the core courses. Students write a
preliminary review of the literature, a review of the literature, or a proposal as the
semester project, depending on the student's progress in the degree program.
- The writing assignment is assessed by means of a scoring guide that is common across
SCED 550, 552, 554, and the College of Education masters' programs.

Reporting Scores:
Writing assignment scores will be reported as a value between 1-6. Scores between 1-4 are
considered acceptable. Scores below 4 indicate that the writing is below the MAT-S Program
expectations. Students who earn scores below 4 will receive written notification with
suggestions for remediation. Scores will be reported each semester by the course
instructors to the College of Education Assessment Director via the Science Education
Program Director. Data will be used for program evaluation and improvement. Student
names and CWIDs are confidential and disaggregated from the data for analysis and
reporting purposes.
# Rubric for Scoring MAT-S Core Semester Project Assignment

<table>
<thead>
<tr>
<th></th>
<th>Exceeds Expectation (5-6)</th>
<th>At Expectation (4)</th>
<th>Below Expectation (1-3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content, Structure, &amp; Style</strong></td>
<td>Addresses the topic clearly and responds effectively to all aspects of the task; ideas are well-developed; explores the issues thoughtfully and in depth.</td>
<td>Addresses the topic clearly, but may respond to some aspects of the task more effectively than others; shows some depth and clarity of thought.</td>
<td>May treat the topic casually, simplistically or repetitively; lacks focus, or demonstrates confused or simplistic thinking; often fails to communicate ideas; distorts or neglects aspects of the task; presenting generalizations without adequate and appropriate support</td>
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<tr>
<td><strong>Completeness of Response &amp; Quality/Clarity of Thought</strong></td>
<td>Organization is excellent in terms of bridges and transitions; paper remains focused with no wandering to unrelated topics; minor points are related to the thesis; ideas flow in sensible sequence; discussion of area is complete before transitioning to another.</td>
<td>Generally good presentation with either bridges or headings but not all the time; paper is generally focused with text following the order presented in the introduction; relationship of ideas made evident</td>
<td>Few clues are used so that text organization is a challenge to reader; relationship of ideas to thesis is vague; text jumps from topic to topic in shotgun approach; reader must work to keep up with flow of ideas.</td>
</tr>
<tr>
<td><strong>Organization, Sequence of Ideas/Focus</strong></td>
<td>Information is accurate and attributed to correct resources; pragmatic suggestions are appropriate to question; appropriate reading terms are employed and well defined.</td>
<td>Information is accurate in description but some resources or definitions are weak.</td>
<td>Errors are present in either content and/or resources and examples; response contains poorly defined terms; definitions are faulty; information attributed to incorrect sources</td>
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<tr>
<td><strong>Accuracy of Content/Vocabulary</strong></td>
<td>Authorities are thoughtfully selected from a wide array of sources and applied appropriately to content; examples are given and well developed for the topic</td>
<td>Ideas generally supported by professionally sound resources however, only general resources repeatedly cited; too few or too many examples are provided</td>
<td>Few resources presented or resources cited limited to class texts; examples are given but no definitions or explanations are provided</td>
</tr>
<tr>
<td><strong>Resources/Support/Examples</strong></td>
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A Theoretical Framework is the foundation of a project or thesis. This section lays out your rationale. It explains how your project relates to some theoretical foundation. It situates your study within the research literature by describing the current research findings and how your study will contribute to the field. To show broader importance, you might cite results from documents such as the Third International Mathematics and Science Study (TIMSS), standardized exams, National Association of Educational Progress (NAEP) reports, and even the National Research Council (NRC) reports. Then introduce your review of the literature with a clear statement of the problem.

Delimit the scope of your research with a research question that could possibly be answered, if you gather the right information. Your exploratory review of the literature should find out if that question has been answered or if the published literature leads to other, more clearly defined, research questions. Each variable to be investigated needs an explicit operational definition, referenced from the literature.

Your brief introduction and definitions should preview the type of literature that will be reviewed, with the main literature that impacts this study identified. Use the titles of articles with proper citations in APA format. Organize the research in a manner that is appropriate for your project or thesis. Use headings and sub-headings to categorize related research findings. The reviews should be critical and should identify any weaknesses or gaps that can be addressed in the current thesis. Each subset should conclude with a summary statement relating that section to your problem and the presence or absence of research related to your study; indicating a need for your study.

The Exploratory Review of the Literature assignment is a limited presentation of the Theoretical Framework in three separate areas. Each review is at least two pages. The theoretical framework for each exploratory review of the literature should include at least one review reference, and a critical summary of at least two primary research articles.

Each article critique should include the following elements:

1. Educational Context
   What is the central concern of the author? The educational context of an article includes both what piece the authors have addressed and what it is a piece of (remember the childhood game of telling where we live by street, city, county, state, nation, continent, planet, solar system, galaxy).

2. Research Design
   What method is this (experimental, quasi-experimental, document analysis, survey, clinical interview, ethnography, etc.)? Who/what were subjects/data source? How were subjects chosen? What variables were measured? How were variables measured? Was this a reasonable design?

3. Findings
   The findings are the results of the measures used, or the results of the observations. Findings DO NOT include interpretations. They include statistical results, classroom observations, etc.

4. Conclusions and Limitations
   What do the findings mean? What do we know now that we didn't know before? Were conclusions drawn spuriously? Are we convinced by the data that the author's conclusions make sense? Do you have an alternative explanation of the data that the authors didn't consider?

5. Implications
   What are the implications of this study for teaching practice, research, and policy? How does it inform your future project?

   **INTEGRATION WITH OTHER STUDIES**

6. Organization
   As you review related articles, you should construct a schema that helps explain the relationship between the articles. This schema should form the structure of your literature review and should help you decide how to organize these articles. This is not simply an issue of "from big ideas to little," because this literature review is focused on the specifics of your research topic. (This is not to say that you cannot include "the big idea" to frame your review, only that it is not the focus of this assignment.) One possibility is to define the independent and dependent variables you will study in your research, and then write one section about what is published on each of those variables.
7. Integration
Discuss the link between the articles. This should be done in an ongoing fashion. Link your first critique to your second, then your third to the first two, and so on. Suggested considerations: Do the data show the same patterns? If they agree, how does one study strengthen the conclusions of the others? If they differ, what are the reasons? Age/ability/ethnicity/gender of subjects? Varying treatment time? Problems with the quality of the research in one of the studies?

8. Links To Your Research Topic
Your final conclusions and implications should address all the articles, and lead to a research topic: Blank says this and Blah says that. However, Blip says all these things. What is missing is research on YOUR TOPIC, OR, research on YOUR TOPIC will clarify these inconsistencies in that . . . OR, research on YOUR TOPIC will extend these studies in that . . . Your Review of the Literature should also include additional references that you might cite only once or much more briefly than an article critique.
LITERATURE REVIEW FORMAT
SCIENCE EDUCATION

Introduce your review of the literature with your Theoretical Framework. This section lays out your rationale. It explains how your project relates to some theoretical foundation. It situates your study within the research literature by describing the current research findings and how your study will contribute to the field. To show broader importance, you might cite results from documents such as the Third International Mathematics and Science Study (TIMSS), standardized exams, National Association of Educational Progress (NAEP) reports, and even the National Research Council (NRC) reports. Then introduce your review of the literature with a clear statement of the problem.

Delimit the scope of your research with a research question that could possibly be answered, if you gather the right information. Your review of the literature should find out if that question has been answered or if the published literature leads to other, more clearly defined, research questions. Each variable to be investigated needs an explicit operational definition, referenced from the literature.

Your brief introduction and definitions should preview the type of literature that will be reviewed, with the main literature that impacts this study identified. Use the titles of articles with proper citations in APA format. Organize the research in a manner that is appropriate for your project or thesis. Use headings and sub-headings to categorize related research findings. The reviews should be critical and should identify any weaknesses or gaps that can be addressed in the current thesis. Each subset should conclude with a summary statement relating that section to your problem and the presence or absence of research related to your study; indicating a need for your study.

While your theoretical framework may include various review references, the body of your literature review paper should critique at least four primary research articles.

Each article critique should include the following elements:

1. Educational Context
   What is the central concern of the author? The educational context of an article includes both what piece the authors have addressed and what it is a piece of (remember the childhood game of telling where we live by street, city, county, state, nation, continent, planet, solar system, galaxy).

2. Research Design
   What method is this (experimental, quasi-experimental, document analysis, survey, clinical interview, ethnography, etc.)? Who/what were subjects/data source? How were subjects chosen? What variables were measured? How were variables measured? Was this a reasonable design?

3. Findings
   The findings are the results of the measures used, or the results of the observations. Findings DO NOT include interpretations. They include statistical results, classroom observations, etc.

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   What do the findings mean? What do we know now that we didn't know before? Were conclusions drawn spuriously? Are we convinced by the data that the author's conclusions make sense? Do you have an alternative explanation of the data that the authors didn't consider?

5. Implications
   What are the implications of this study for teaching practice, research, and policy? How does it inform your future project?

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6. Organization
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Discuss the link between the articles. This should be done in an ongoing fashion. Link your first critique to your second, then your third to the first two, and so on. Suggested considerations: Do the data show the same patterns? If they agree, how does one study strengthen the conclusions of the others? If they differ, what are the reasons? Age/ability/ethnicity/gender of subjects? Varying treatment time? Problems with the quality of the research in one of the studies?

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THESIS/PROJECT PROPOSAL FORMAT

Proposed Title Page (according to the Graduate Studies Thesis Manual)

Abstract – 150 words

Chapter 1: Introduction

The introduction should be a pragmatic argument for your study about an issue in science education. To establish the importance of the problem you've selected, you may want to use personal anecdotal information (about your class, your school, and your district). Quantitative observations strengthen your argument. Speculation is not acceptable unless it is supported with specific evidence or a published reference. To show broader importance, you might also cite results from documents such as the Third International Mathematics and Science Study (TIMSS), standardized exams, National Association of Educational Progress (NAEP) reports, and even the National Research Council (NRC) reports. Chapter One should end with a clear statement of the problem and a preview of how your research will address this problem.

Chapter 2: Review of the Literature

A brief introduction should preview the type of literature that will be reviewed, with the main literature that impacts this study identified. The review of the literature must include primary research articles. Subsets of the literature can be organized under sub-headings. The reviews should be critical and should identify any weaknesses or gaps that can be addressed in the current thesis. Each subset should conclude with a summary statement relating that section to your problem and the presence or absence of research related to your study and indicating a need. At the end of the review of the literature, a concluding paragraph should summarize the main findings and lead directly to your research questions and/or hypotheses.

Chapter 3: Research Methodology

Find published primary research articles with the components of your planned research methodology to use as a model. The methodology you choose should be justified based on precedent, therefore reference citations are appropriate in Chapter Three.

Chapter Three should introduce the research questions and/or hypotheses with great clarity. A good research question will limit the scope of the problem.

Variables: Each variable to be investigated needs an explicit operational definition.

Hypotheses: Each hypothesis should explicitly identify independent, dependent, and controlled variables.

Research Design: the research design should introduce the treatments, data to be collected, time table, and plans for statistical analysis of the results.

Sample: the sample should be described in great detail so that others will understand the degree to which results can be generalized to other populations. Be sure to include the total sample size and the number of subjects in each treatment. Any characteristic that could become a confounding variable should be identified. Examples of co-variables include age, gender, socioeconomic status, language status, and academic achievement scores. You should identify all factors that could impact the results of your study.

Treatment: the treatment should be laid out in enough detail that someone else could replicate the study. The time variable should be explicit. Reputable sources for each treatment should be identified, with publications cited.
**Evaluation Instruments**: describe what is measured by each instrument, with reference to the literature to support the validity and reliability for each measure. Sample evaluation instruments should appear in the Appendix.

**Data Collection**: who will collect the data, what type of data will be collected at various points in the study, and how will the data be recorded. What procedures will guarantee that the data is confidential, secure, and valid.

**Data Analysis**: describe how the data will be organized into tables, graphs, analyzed, what statistical package may be used, and what comparisons will be made.

**Limitations of the Research**: disclose major limitations that might compromise your findings. Address issues of validity and reliability.

**Expected results**: Data tables with n and p values should be organized according to each hypothesis studied. Expected results include the preliminary data from the Action Research and all pilot studies.

**Anticipated outcomes**: Reflect back to they hypotheses and/or research question. Write a statement such as, "Should the results show that X is related to Y, then the implication is Z. If, on the other hand, X is not related to Y, then the implication is Q."

Include permissions and a timeline for implementation and evaluation in table form.

The final thesis will incorporate these three chapters plus chapters Four and Five. Chapter Four includes all results, with tables, graphs, and statistical measures. The discussion in Chapter Four can place the results in context, but should not include interpretation of the results. Chapter Five begins with unambiguous statements telling the answer to each research question and whether results support or refute each hypothesis. Results should be related to other published literature so that it becomes clear how your results support or refute what's published. This should be followed by general conclusions, implications for instructional practice, and questions for further research. References: Use the American Psychological Association style manual, because all formatting must be presented in APA style. Use the Graduate Studies Thesis Manual for the Graduate Office for guidance on margins, pagination, and layout.

**Appended Materials**: Sample curriculum/instructional modifications to be implemented, examples of evaluation instruments.

A rubric will be used for scoring your oral and written report.