

## **GUIDELINES FOR THE PH. D. QUALIFYING PROCESS IN MATHEMATICS EDUCATION**

### **PURPOSE**

Prior to beginning a doctoral dissertation and at or near the time of completion of all coursework, all Ph.D. students in the School of Education must pass a qualifying examination in their major and minor areas of study. For students in the mathematics education doctoral program, this examination takes the form of a qualifying portfolio and an oral examination<sup>1</sup>. The qualifying portfolio is intended to assess the student's understanding of major concepts and issues in mathematics education as well the breadth and depth of her or his preparation in the field. The portfolio includes work that is produced during the program of studies, original work produced for the qualifying examination, and synthesis and section reflections. Taken together, the portfolio and the oral are meant to demonstrate that the student is ready to undertake independent research; that is, that the student is qualified to conduct a doctoral dissertation.

Although the qualifying examination is a requirement of the University Graduate School, it does not specify what form this examination should take. The mathematics education faculty has chosen a format that also helps students prepare for similar reflective activities that they will undertake as professionals. It is not uncommon to find job postings that ask applicants to submit personal statements of teaching, philosophy of learning, and scholarship plans. Furthermore, when holding a faculty position, promotion and tenure reviews require the preparation of annual reports, pre-tenure portfolios, and promotion and tenure dossiers. Work on the syntheses and reflections that are part of the qualifying portfolio should provide good preparation for such future professional activities.

### **SIZE & FORMAT (PRINT VERSION)**

In order to insure that the same standards are expected of all students, each portfolio will be about the same size and will have the same general format. Specifically, each portfolio will meet the following requirements:

1. The entire portfolio must fit in a single one-inch notebook.
2. The first page must be a title page.
3. Page 2 must be a table of contents page indicating the main sections of the portfolio and including the page number on which each section begins<sup>2</sup>.
4. Each section of the portfolio must begin with a page describing the purpose of the

---

<sup>1</sup> For minors inside the School of Education, the student's minor representative will decide what sort of qualifying process (test, portfolio, papers, etc.) suffices. For minors outside the School, the minor representative has the option of requiring some sort of qualifying process or waiving it.

<sup>2</sup> A template for the Table of Contents is given at the end of this document.

section, and the entries included in that section. Each section should include a brief reflection about that section<sup>3</sup>.

5. Section dividers must be included to insure easy identification of the beginning and end of each section.

### **ELECTRONIC SUBMISSIONS**

Qualifying portfolios can be submitted in electronic form. The length of the electronic portfolio should not exceed the equivalent of 220 double spaced pages. Students should plan on making their electronic qualifying portfolio available to the mathematics education faculty via the Internet, placing the file in their ePortfolio, or a similar site. Electronic portfolios should be submitted as a single pdf file with appropriate bookmarks and hyperlinks. At a minimum, bookmarks and hyperlinks should be created for each item listed in the table of contents. However, one reason to opt for the electronic format is because it allows highlighting connections that would be difficult to articulate in a linear style of writing. Therefore, students choosing this format are encouraged to take full advantage of this media. Students should have in mind that the focus should continue to be the content of what is prepared, and to convey their understanding of mathematics education, rather than on embellishments with no academic value added.

### **DUE DATE**

A student will negotiate the due date for completion of the qualifying portfolio with members of her or his program advisory committee and in consultation with her or his advisor. The due date will be at least four weeks before the date of the oral examination.

### **PORTFOLIO ASSESSMENT & ORAL EXAMINATION**

All members of the faculty of the Mathematics Education Program will have the opportunity to read and provide comments on a student's portfolio. Mathematics education faculty members of the student's program advisory committee are expected to assess the portfolio. Minor area representatives can read and assess the portfolio if they choose to do so. All faculty members who assess it will use the same rubric for the portfolio. Although a specific rubric has not yet been developed, the quality of a portfolio will be based on the following sorts of criteria: (1) breadth of familiarity with the literature in the areas included in the portfolio, (2) depth of understanding of the literature in the areas included in the portfolio, (3) ability to express oneself clearly, coherently, and in a convincing manner, and (4) insightfulness of reflections.

After all faculty evaluations have been completed, an oral examination will always be held. The purpose of this part of the qualifying examination is for the advisory committee to discuss the written work in the qualifying portfolio, to request elaboration or clarification about entries that were poorly completed, and to quiz the student in-depth

---

<sup>3</sup> A section may contain more than one entry. An entry within a section is a piece of evidence used to document the student's competence in an area.

over any or all of the examination material. The student's advisory committee will determine the specific nature of the oral examination, but it will always include discussion of concerns and questions about particular entries in the portfolio, as well as opportunities for the student to demonstrate an ability to "think on her or his feet."

### FINAL EVALUATION

Upon completion of the oral examination, the student's program advisory committee will determine whether the quality of the student's portfolio and her or his performance on the oral examination warrant passing the student on the qualifying process. A pass will indicate that once the student has completed all necessary coursework, he or she will be admitted to candidacy<sup>4</sup>. If the decision is that the student has not passed the qualifying process, the committee will select from among the following options: (1) ask the student to redo all or some portions of the qualifying portfolio, (2) ask the student to retake the oral examination on a future date after completing certain tasks, (3) a combination of options 1 and 2, and (4) inform the student that he or she is dismissed from the doctoral program.

### AREAS OF COMPETENCY

The portfolio must document competency in each of the following areas:

- ◆ Substantial work with inquiry in education (e.g., via a paper based on the early research experience, documentation of involvement with research during an internship, a research paper from a course).
- ◆ Work related to at least three different N716 seminars taken by the student, with the sort of evidence to be decided via negotiation with the faculty member who taught that seminar (e.g., via a paper written for an N716 seminar, an original paper written since taking a seminar but related to the topic of the seminar, a sit-down test on questions relating to a seminar topic).
- ◆ Substantial work done in the area of teacher education—either K – 8 or K – 12, depending on the student's program emphasis (e.g., via selected instructional material used in teaching an undergraduate methods course, material developed for use in a professional development workshop, a paper related to theoretical or philosophical issues in teacher education).

### PORTFOLIO CONTENTS

The portfolio should include the following required entries as evidence of the competencies discussed above:

- ◆ *Personal information.* A current curriculum vitae and any letters of reference that speak to the student's growth and development in some area. These letters are not to

---

<sup>4</sup> Admission to candidacy designates that the student is eligible to begin work on a doctoral dissertation. Refer to the current *Bulletin of the Graduate School* for further information about admission to candidacy.

be written by members of the mathematics education faculty, and they are to be included if they document aspects of growth that cannot be documented with other entries in the portfolio.

- ◆ *Section reflections.* A reflection on each section of the portfolio explaining how the work included in the section is indicative of the candidate's professional growth and development in a certain area of competency. [Refer to “Synthesis and Section Reflections” below.] (Note. The section containing the “synthesis reflection” need not contain a section reflection.)
- ◆ *Section descriptions.* Descriptions of the purpose of the entries included in each section. The description is to explain how each artifact included provides information on the knowledge, skills, or dispositions of the candidate
- ◆ *Synthesis reflection.* A “synthesis reflection” tying together all of the student’s work to date and connecting that work to the student’s professional goals. [Refer to “Synthesis and Section Reflections” below.]
- ◆ *Original writing.* At least one new, original piece of writing. This piece of writing was not produced to meet the requirements of a class or seminar, and is not the dissertation proposal. Students should obtain prior approval from the advisor on the original writing to include in the portfolio.
- ◆ *On demand writing.* Two original pieces of on demand writing. After the student has submitted the portfolio, the advisory committee will select two questions to be given to the student to be answered in two short papers within two weeks. The topics will be selected from the areas of study included in the reading list provided at the beginning of the doctoral program.
- ◆ *Student’s choice.* At least one entry entitled “student’s choice.” Possibilities include, but are not restricted to: a published or publishable paper, a literature review related to a dissertation, a significant piece of curriculum development work, or a particularly creative web design. Students should obtain prior approval from the advisor on the choice entry to include in the portfolio.

## **SYNTHESIS AND SECTION REFLECTIONS**

As noted above, the qualifying process in the mathematics education program, as it is in many doctoral programs, is intended to show that the candidate has both a broad range of knowledge in the field and the skills necessary to complete a dissertation on a relatively focused topic in the field. More specifically, the synthesis reflection and section reflections in the portfolio are key pieces of evidence for documenting knowledge and skills.

The synthesis reflection should (a) tie together all of the candidate's work to date and connect it to the candidate’s professional goals, (b) situate the candidate's work and orientation within the professional literature and should present a coherent account of the candidate's vision of herself or himself as a member of the professional mathematics education community, and (c) conclude with a discussion of the candidate's professional plans and intended contributions to the field of mathematics education.

Section reflections should be included for each major section in the portfolio. Each

reflection should explain how the work included in the section is indicative of the candidate's professional growth and development in a certain area of competency. In cases where an unrevised paper is included as an artifact, commentary on how the paper could have been revised to deal with commentary provided by an instructor on the paper and the candidate's own personal growth is usually beneficial.

Section descriptions should refer to each major artifact in the section. In this section there should be explanations of how each artifact provides information on the knowledge, skills, or dispositions of the candidate.

Between the synthesis and section reflections, there should be discussion of how each sample in the portfolio is indicative of the candidate's professional growth and development. These documents should also help demonstrate competence in designing and conducting empirical research or other forms of scholarly inquiry in the field, or in developing curricular or pedagogical innovations built on sound principles.

When writing reflections, keep in mind that in contrast to reflections that share one's feelings about a topic, the goal of the synthesis and section reflections is to document knowledge, skills, and dispositions. The best documentation comes from examples of what the candidate has accomplished in terms of scholarship rather than examples of what the candidate has done. To put this another way, while documenting classes and activities the candidate has participated in can be helpful, the real goal is to show how those classes and activities made a difference in helping the candidate transition into becoming a scholar. The portfolio is an opportunity to demonstrate one's strengths and high quality portfolios take advantage of this opportunity.

A final issue is length of the reflections. Good reflections are concise and include relevant examples to support generalizations. While there is no length requirement, it is rarely necessary to go beyond three double-spaced pages per section reflection or beyond 20 double-spaced pages for the synthesis reflection to make the points that need to be made.

### **EVIDENCE x COMPETENCIES MATRIX**

As indicated above, the portfolio will include entries of several kinds, with each entry serving as evidence of competency in some area. The following matrix, which is intended as a guide to the student in preparing the portfolio, lists various types of entries and competencies to be demonstrated. During preparation of the portfolio, a student can use this matrix to match evidence (entries) and competencies and to identify competencies for which evidence is still needed. For example, a student might notice that he or she does not have any evidence to support competencies in teacher education, even though he or she has included an entry for each type of evidence. This would necessitate the identification of an additional piece of evidence, perhaps an original paper. *This matrix should be placed at the end of the portfolio, with checkmarks indicating the match between evidence and competencies.* [Note. It is not necessary that every cell of the matrix be filled.]

Table 1  
*Evidence x Competencies Matrix*  
*Competencies*

<i>Evidence</i>	Inquiry Work	N716 Seminar I	N716 Seminar II	N716 Seminar III	Teacher Education
Personal Information					
Section Reflections					
Synthesis Reflection					
Original Writing					
Student's Choice					

### PORTFOLIO PREPARATION

Because the portfolio is intended in part as evidence that the student is prepared to undertake independent inquiry, the faculty of the Mathematics Education Program and minor area representatives on the student's committee should not assist the student in any way in preparing any materials that will be included in the portfolio<sup>5</sup>. No faculty member, including the student's advisor, will read or react to drafts of papers or other materials being considered for the portfolio. The only exception to this policy is that the student's advisor may help the student conceptualize the portfolio. Students may consult with other students or non-mathematics education faculty as they prepare materials for their portfolios.

### SAMPLE TABLE OF CONTENTS

A sample Table of Contents is shown below as an aid in preparing the portfolio. This sample also illustrates the importance of organizing the contents of the portfolio in a way that will make it easy for the reader to determine the competencies a particular entry is evidence of.

---

<sup>5</sup> Of course, some materials will have been produced previously under the direction of or with assistance from faculty members.

**Sample Table of Contents: 1 original piece of writing, 3 student’s choice papers, 1 set of teacher education materials**

QUALIFYING PORTFOLIO OF WINIFRED S. MCARTHUR

Table of Contents		
1. Personal Information		3
Curriculum vitae		
Letters of reference		
Professor J. P. Lewis		
Ms. R. T. Sanchez		
2. Synthesis Reflection		11
3. Inquiry		32
Purpose and section description		
Original paper		
Section reflection		
4. N716 Seminar I (Technology)		47
Purpose and section description		
Revision of seminar paper		
Section reflection		
5. N716 Seminar II (Assessment)		69
Purpose and section description		
Revision of seminar paper		
Section reflection		
6. N716 Seminar III (Learning Theory)		84
Purpose and section description		
Unrevised seminar paper		
Section reflection		
7. Teacher Education		108
Purpose and section description		
Materials developed for Educate Indiana workshops		
Section reflection		