

## **The Student Mathematics Portfolio: Value Added to Class Preparation?**

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### **Abstract**

This paper describes key elements for teachers to successfully implement a student portfolio in their undergraduate course. This paper offers practical experience in implementing a student mathematics portfolio for a freshman Precalculus course and looks at the potential value added to daily class preparation and traditional classroom assessments of the portfolio. The paper provides strong anecdotal and student self-confidence evidence that student portfolios provide increased performance in the course.

Keywords: Portfolio, mathematics portfolio, mathematics instruction, pedagogy

### **I Introduction**

After teaching freshman mathematics for a year and based on my own undergraduate education experience, I noticed that those students that were more organized throughout the semester tended to do better academically both in terms of grades and understanding of the course content. As an instructor, I tried to verbally share my organizational insights with my students but to no apparent avail. Consequently, this year I decided to require my students to maintain a mathematics portfolio that I would collect and assess throughout the semester. As an additional incentive, I decided that the portfolio would represent three percent (30 points) of their semester course grade. However, deciding to implement something in the course and fully realizing all that was really entailed in the exercise is another matter. Throughout the semester, I struggled with how to take full advantage of using a portfolio in the classroom and discovered that like most things this is a growing process.

Traditional mathematics education, at all levels, has relied heavily on homework and tests to evaluate student progress but these tools do not always yield sufficient or suitable information concerning a student's growth. Educators are constantly in search of new or revised assessment techniques to address these shortcomings and a mathematics portfolio has become more popular as a potentially effective assessment tool [Stenmark 1989, Clarke and Clarke 1990, Grace 1992]. The growth of the mathematics portfolio is linked directly to the National Council of Teachers of Mathematics (NCTM) Curriculum of Standards' [NCTM 1989, 1991] which requires all students to: (1) learn the value of mathematics, (2) develop mathematical confidence, (3) become problem solvers, (4) learn how to communicate mathematically, and (5) learn how to reason mathematically.

So, what is a mathematics portfolio? Why should a mathematics teacher use a portfolio? How should a teacher organize, implement and assess a mathematics portfolio? This paper will address each of these questions and present insights from a specific application of a mathematics portfolio for a freshman undergraduate pre-calculus course.

### **II What is a Mathematics Portfolio?**

Portfolios have long been used successfully by educators to evaluate a student's work in both the arts and humanities. Since publication of the NCTM guidelines and standards [NCTM 1989, 1991], portfolios have become a popular assessment mechanism for grade school mathematics teachers. Much like an art portfolio, a mathematics portfolio represents a collection of a student's work intended to provide evidence of their understanding, and if collected over a period of time their growth in the subject [Crowley, 1993, Stix 1994]. A properly developed portfolio serves to

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facilitate both communication between student and teacher and provide additional information concerning the student's progress and needs.

What actually goes in a mathematics portfolio is open to some debate and discussion. The literature suggests that mathematics' portfolio should include representations of student problem solving applications, projects, mathematical investigations, writing examples, reflections and completed tasks, categorized across three broad categories: problem solving, reflective writing and teacher selected work [Lambdin 1994, Ferguson 1992, Crowley, 1993, Crowley & Dunn 1995]. Most of the literature concerning mathematics portfolios is directed at the K-12 grade levels. There is very little literature that discusses implementation of a mathematics portfolio at the undergraduate level but a review of the objectives established by the NCTM and success experienced by K-12 mathematics teachers suggests that there is no reason not to expect success in an undergraduate mathematics course.

### **III Why Use a Mathematics Portfolio**

Portfolios provide an opportunity for students to take an active role in their own assessment and progress toward the course objectives. I had several objectives for implementing the portfolio in my course. First, I was looking for a method that stressed the importance of organization, daily preparation and the development of effective study habits in the course. Second, I wanted something to foster an attitude of the necessity of completing suggested homework problems, in-class board problems and a personal reassessment (reflection) of quizzes and exams. The last objective was for something to serve as an assessment tool of student progress through the course other than fixed grades in time.

A mathematics portfolio provides the mechanism to get at each of the above identified objectives [Lambdin 1994, Kuhs 1994]. However, in retrospect, I realized early that I did not know exactly what a good portfolio looked like or how I would eventually assess it. What follows includes insights into how I eventually organized, implemented and assessed the mathematics portfolio in the course.

### **IV Organization, Implementation and Assessment of a Mathematics Portfolio**

As mentioned earlier, the organization and implementation of the portfolio was a learning process throughout as my attitude of what to expect changed during the semester. The final implementations are not all original concepts but were effective techniques gleaned from the literature, modified and updated to fit my situation.

#### *4.1 Portfolios are not the same as Notebooks*

At the beginning of the semester, I initially equated a portfolio with a standard student course notebook, after all a notebook captures most of my objectives of stressing completion of assigned work and organization. However, a true portfolio requires reflection, writing and self-critiquing to present a full assessment of learning and to fully realize all of my stated objectives. There was nothing more valuable for the student who did not do well on the first WPR than to critique their own notebook while looking at the graded test questions and the incomplete concept pages in their own notebook. This individual reflection and self-critiquing exercise provides more growth than a semester of my stories about how important organization is to success in academics. What was missing from this first implementation is more opportunity for student reflection. Students were required to write a short statement at the beginning of the semester addressing what they hoped to get from the course and what I, as their instructor, could do to help them

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achieve their objectives. I missed the opportunity to have the student update their initial statement throughout the semester. I believe this additional reflection provides one additional opportunity to capture evidence of student growth during the course. Future implementations will incorporate more of these elements into the portfolio.

### 4.2 *Create a Portfolio Culture in the Classroom*

It is critical to ensure that portfolios become an integral component of day to day operations in the classroom. The portfolio loses its effectiveness if it is perceived by the students as a project assigned at the beginning of the semester to be collected and assessed at the end of the semester. This perception allows students to procrastinate and attempt to bring the portfolio together in time for submission. Effective implementation requires student acceptance of a portfolio's importance early in the course. The following implementation techniques were developed and updated throughout the semester to ensure that my students were encouraged to maintain their portfolios.

**Establish a clear purpose for the portfolio** – students need to understand the links between a portfolio and success in the course. Educators need to know in advance exactly what they expect from the portfolios and communicate this information to their students. The requirement to maintain a portfolio is outlined in the student course guide issued to each student. I also introduced the portfolio requirement on the 2nd day of the course and discussed the value of maintaining it throughout the semester and mentioned its weight in the course evaluation. This introduction included the advantages of organization, self assessment and eventual Term End Exam (TEE) preparation.

**Establish clear assessment criteria** – provide your students a rubric early in the semester. Students need to understand how you plan to assess their work. Do you plan to assess their collection of quizzes and tests or do you have additional elements (e.g., written reflections) that you plan to assess. Each student was provided with a rubric (appendix A) at the beginning of the semester that outlined how I planned to assess their portfolios and I referred to it several times throughout the course as a reminder of the requirement. I established at the beginning of the semester that each student would turn-in their portfolios as they turned in their completed Written Partial Review (WPR). This requirement forces students to put something together for use during the exam.

**Use portfolios on a daily basis if possible** – An incomplete notebook provides little value to daily class preparation. Throughout, the semester I stressed the importance of completing homework, daily board sheets and making corrections to any returned assessments. Students were provided access to worked solutions for all assigned material to assist in completing any missed work and making corrections. As added emphasis, students were authorized to use their notes on each of the nine mini-quizzes given during the semester. The objective was to have students maintain their portfolios and gain their own insight into the value of an organized and complete portfolio.

**Make students responsible for maintaining an up to date and organized portfolio** – The rubric clearly articulated the requirement to maintain the order of all daily assignments and reassessments (corrections to missed problems). This point was stressed by allowing students to use their portfolio throughout the semester.

**Provide multiple opportunities for feedback on the portfolio** – The portfolio was reviewed twice formally by me and once informally by the student. After the first WPR, I reviewed each student portfolio and provided written feedback on their portfolio and a score between 1 – 5 points. The second formal assessment occurred after the second WPR where each

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student once again received written feedback and a score between 1 – 25 points. Students were provided a third optional formal assessment at the conclusion of the third WPR to gain back any of the points they might have lost during the second formal assessment. Each student also performed an informal assessment of their own after I returned their portfolios and graded first WPR. The objective was to write a short paragraph of how (or why didn't) their portfolio helped them on the WPR.

### *4.3 Implementation in the Classroom*

All students at the United States Military Academy (USMA) are required to complete a challenging four sequence mathematics program that includes discrete analysis, single and variable calculus, probability and statistics. Most students arrive at West point with at least an introduction to calculus. However, every year there are a handful of students who are admitted with a weaker mathematics background or an unusually long break since their last mathematics course in high school. These students are required to take a fifth sequence of mathematics are enrolled in a Precalculus course to increase their mathematics skills. My research addressed the merits of a mathematics portfolio during a freshman first semester course in Precalculus. Historical analysis of grades shows that this particular group of students struggle academically their first year. Hopefully, the implementation of a course portfolio will improve the overall experience for these students. The course initially consisted of 50 students divided between two instructors across four sections. I shared teaching responsibility with a second instructor who would serve as the control group (non-portfolio group) for the implementation. All sections used the same course wide assessments, term end exams (TEE) and projects. The major difference in course assessment was the inclusion of the evaluated portfolio for my two sections worth of students (portfolio group).

In addition to this course, all students are enrolled in a student success course (RS101) at the institution's center for enhanced performance (CEP). The objective of this course is to help these students with organization, time management and academic skills to improve importance. I discussed the major aspects of the portfolio requirement as outlined in section 4.3 with my students. My counterpart did not emphasize the notebook during the course but did check daily homework for the first ten lessons to emphasize daily preparation. He also collected his student's notebooks at the conclusion of the first WPR and provided informal feedback the notebooks. I coordinated for one of the student's CEP instructors to sit through all of my lessons. This instructor worked side by side with the students completing all of the daily work and taking every assessment as a student. This provided invaluable insight during the cadet's RS101 class since their instructor set through the same material and new what belonged in the course portfolio and updated it daily.

### *4.4 Assessment*

The assessment mechanism developed for this research attempted to target success or failure of the portfolio's contribution in achieving the stated objectives of organization, daily preparation and effective study habits. The assessment comes in three forms: a statistical analysis of course grades, an assessment of the portfolios themselves and student survey results.

#### *4.4.1 Statistical Analysis*

The initial goal was to determine if there were any statistical significant differences in academic performances between the two groups of students. Since course end grades include different

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instructor point assessments, I was concerned about the ability to isolate the effect of course portfolio versus other confounding factors if I used course grades. In response, I considered student performances in three areas. The first assessed area consisted of a combined score that covered each of the three major exams (WPR) and the TEE. This provided a broader range of assessments to capture any potential growth during the semester. Since the exams were all open note assessments, the expectation is that those individuals that were organized in thoughts and notes would score higher. The second performance assessment consisted solely of the TEE grade. This exam, more than any other event, was graded in tandem to ensure equity in the evaluation and should have removed many of the potentially confounding factors. The final assessment consisted of all shared experiences by both groups in the course. These experiences included all of the exams, projects, graded homework and represented approximately 85 percent of a student's course grade. The inclusion of graded homework should provide the effect of routine day to day preparation. Figure 1 provides the descriptive statistics of the two groups (portfolio and non-portfolio) for the three assessed areas.

A review of the box plots seems to suggest that the students with increased emphasis on the portfolio tended to perform better on each of the three assessed areas. To confirm this observation, I conducted an Analysis of Variance (ANOVA) statistical calculation with Minitab to determine the actual strength or presence of any statistical significance between the means of

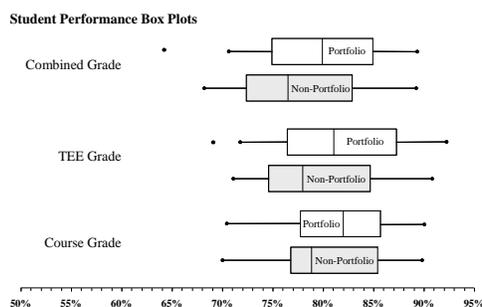


Figure 1 Student Performance

the three groups. Unfortunately, the statistical output (p-values) suggests that there is not a statistical difference between the two groups of students. This finding suggests that there may be some other unaccounted for confounding issue that is attributing to the differences. One such confounding issue might have been that all students were enrolled in RS101. This course provided external emphasis throughout the semester on organization and maintaining a notebook for the non-portfolio group that may be a contributing factor.

One stated objective was to gain an increase in student daily class preparation with a corresponding increase in completion of suggested homework problems and board sheets. This objective was informally assessed through weekly in class surveys and the tracking student visits to the math clinic. During the first four weeks of the course leading up to the first exam, students were asked to submit (using the muddiest point format) the average amount of time they spent studying and preparing for the next day's class. Figure 2 tracks this performance for both instructors during this period. A review of Figure 2 provides no clear indication of an increased amount of study time for the portfolio students. However, the responses did confirm expectations that students typically spend a little less than an hour each night preparing for the next day's lesson. This snapshot seems to support the statistical analysis of no difference between the

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group's average performances. There may have been a problem with stopping the survey after only four weeks. My first assessment of student portfolios was returned in the fifth week. This assessment and performance on the first exam might have translated into an increase in study time.

Each student in the portfolio group was expected to complete all board sheets and make corrections to any missed quiz and exam problems. This expectation in theory should translate to more time spent preparing for the lesson or more time examining the course solution book.

Figure 3 tracks the number of students who signed in to the math department's clinic to use the

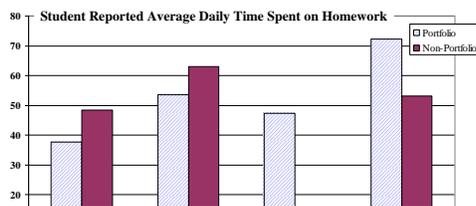


Figure 2 Student Reported Average Daily Study Time

solution manual. The solution manual was updated every day and included worked solutions for all assigned work. Figure 3, as with time spent on homework, shows no increased trend among the portfolio students. The fact that on average only 9.2% of the students, enrolled in the course ever used the solution book is a surprising and disappointing result. One of the metrics identified in the portfolio rubric was the requirement to complete all board sheets and to make corrections to quizzes and exams. The tracking of so few students signing in to the clinic served as an early indication of what to expect when I received the individual portfolios.

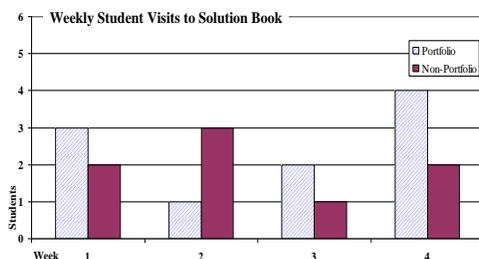


Figure 3 Number of Students Signing in to the Math Clinic

Descriptively there appears to be a slight increase in test scores among the portfolio group versus the non-portfolio group but other confounding factors prevent any references to the portfolio as the single source of the increased performance. The following section examines student performance on the portfolio itself.

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### 4.4.2 Portfolio Results

I evaluated the portfolios twice during the semester using the rubric provided in Appendix A. The first evaluation occurred at the conclusion of the first exam, four weeks into the course and the second evaluation was at the conclusion of the second exam, approximately 12 weeks into the semester. The portfolios ran the gambit from very well organized and maintained to the obvious no thought given to even maintaining notes.



Figure 4 Sample Student Portfolio

The major portion of the assessment beyond organization, neatness and completeness covered five areas; suggested problems, graded homework, mini-quizzes, board sheets, and exams. Students were expected to have all assigned items present in their portfolio and to have made corrections for any missed problems on the homework, quizzes and WPR. I examining the portfolios I paid particular attention to two areas, corrections to missed work and board sheets. I emphasized throughout the semester that making corrections while the material was fresh would pay dividends later in the semester and especially on the TEE and I spot checked several examples in all groups. I paid more attention to the board sheets, examining most of them in each portfolio. Almost every lesson, students were provided a board sheet to reinforce important objectives of the lesson. These board sheets were usually double sided and built concepts from the front to the back of the sheet. Typically the final problem on the back of the sheet was representative of the type of problems a student might encounter on the exam. Generally, during the course of the class most students do not complete these problems. I repeatedly emphasize to the students the advantage of completing these problems on their own time and reminded them that worked solutions were located in the math clinic.

The average portfolio grade was 75.31 percent with five of the 27 students receiving a failing grade. As mentioned earlier, the general organization of the portfolios ranged from excellent to poor. Figure 4 provides an example of one student's portfolio that was collected after the TEE. Despite repeated evaluations and an increased emphasis this represented the student's organizational effort. However, out of fairness there were two other portfolios that were of equal quality as Figure 4 and the student received a C+ in the course. The student repeatedly stressed throughout the semester that he did not see a need for organization and that this system worked for him.

A review of overall performance in the five major areas shows that most students attempted all of the suggested problems which dovetails with the fact that students were doing some level of preparation for the next day's lesson. Three students actually completed all board sheets but only 29.63 percent of the students completed more than half of the board sheets. Each of these students

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received a B or higher in the course. A review of corrections shows that 48.14 percent of the students made corrections to more than half of the missed problems in the sample set of reviewed assessments. Approximately 84 percent of these students received a B- or higher in the course. There was only one student who corrected all missed work. It is interesting to note that student made all of the corrections without the benefit of the course solution book and she received an A- in the course. Overall, there appears to be a strong correlation between a student's performance on their portfolio and their performance in the course.

Figure 5 plots student performance on their portfolio versus their final course grade. The chart clearly indicates a positive trend that as a student's portfolio grade increases there is a tendency for an increase in course grade.

There may not have been a statistical difference in performance between the portfolio and non-portfolio group but there appears to be strong anecdotal evidence that student's with a well maintained portfolio are doing better.

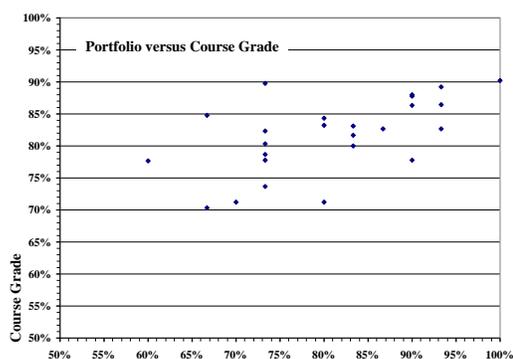


Figure 5 Portfolio Graded Versus Course Grade Correlation

### 4.4.3 Student Survey Results

Most of the literature concerning the advantages of course portfolios focuses on theory, expert opinion and descriptions of successful implementations. There is little attention in the literature placed on gathering and understanding student opinion on maintaining a course portfolio. My goal was to determine from the student's perspective if they thought a portfolio notebook was beneficial in the course. I used a simple survey assessment tool in an attempt to capture individual student attitudes and perceived benefit of maintaining the course notebook. I implemented this survey in two phases. The first implementation was at the conclusion of the semester after the students had taken the term end exam (TEE) and the second implementation was 14 weeks into their follow on mathematics course after they had completed the second exam (WPR).

#### 4.4.3.1 Survey I

The first survey targeted their attitudes after receiving my final assessment of their notebooks, the completion of their own assessment and then utilization on the TEE. This initial survey was not anonymous since I wanted to link individual attitudes with actual performance. I anticipated that this survey approach and their actual success in the course or on the TEE would likely color their perceived advantage of maintaining a portfolio. I was initially worried about receiving candid opinions but was pleasantly surprised with the range of responses. Survey I contained the

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following five questions with the additional instruction of commenting why or why not to prevent simple yes or no answers (note: Q5 was reserved for only portfolio students).

Q1. Do you believe that being required to maintain a course portfolio helped you prepare for the daily lessons?

Q2. Do you believe that your course portfolio helped you prepare for the WPR?

Q3. Do you believe that being allowed to use your course portfolio helped you during the WPR?

Q4. Did knowing that your instructor was collecting and reviewing your portfolio influence you to maintain the notebook throughout the semester?

Q5. Did knowing that your portfolio was worth 3% of your course grade influence you to maintain the portfolio throughout the semester? If not what might have been a better motivation?

Of the 56 students who took the course, 49 students attended the last day of class and completed the survey. The remaining seven students departed the academy prior to the TEE. Table 1 contains the binary (yes, no) responses to the survey. It is interesting to note that the non-portfolio group expressed the same level of support for the portfolios despite the reduced emphasis and evaluation throughout the semester.

The cadets' answers to the questions on the survey reflect the overall positive trend displayed in Table 1 regardless of instructor. The vast majority of the comments were favorable to the requirement of maintaining a course portfolio and its usage on exams regardless of instructor or final grade in the course. The comments below are taken from the survey and reflect the prevailing thought of most cadet responses.

**Table 1 Student Response to Survey I**

	Portfolio		Non-Portfolio	
	Yes	No	Yes	No
<b>Q1</b>	22	5	17	5
<b>Q2</b>	24	3	21	1
<b>Q3</b>	25	2	20	2
<b>Q4</b>	23	4	20	2
<b>Q5</b>	20	7		

Q1. "I think that it helped a great deal, the course notebook helped me personally stay organized and be prepared for class."

"It most definitely helped because our notes were easily accessible and the cumulative coursework was easier to follow with an orderly notebook."

"I failed to maintain organization throughout the semester. If I had been more organized I believe it definitely would have helped though"

Q2. "Yes, because I was organized everything was easier to find. I knew where to find all of the information for specific topics we discussed."

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“When I studied I didn't have to look around for lesson assignments. They were all organized and ready for use.”

Q3. “Very much! I couldn't imagine moving at the pace we moved at and not being able to use our notes on the WPRs.”

“I feel in some ways I put all my reliance on my notebook rather than what I actually learned. But if I didn't have my notebook or notes, I probably would have failed.”

“It definitely helped on the WPR. Being organized was the key, and the fact that you checked it near the time of the WPR forced us to organize.”

“The notebook did not help me personally during the test because I felt it would take too much time to flip through it for every problem so I did not use it at all.”

Q4. “Knowing That LTC Burks was collecting my notebook absolutely made me want to maintain it better. I didn't want him to think I was all ate up.”

“To be honest, no. I would organize a couple nights in advance of the turn in date, but at least it was organized at the time of the WPR.”

Q5. “I looked at having my notebook organized as earning free points. I needed those points to help me pass the course.”

“No, didn't realize that it was worth 3%.”

Despite their performance in the course, many students felt in some fashion that maintaining a portfolio was beneficial. What is interesting is some of the negative comments I received. The comment from Q1 of “I failed to maintain organization throughout the semester ...” was turned in by a student who received a B- in the course.

### *4.4.3.2 Survey II*

The second set of survey questions followed after the students completed their second WPR during their follow-on course. The survey contained the following questions five questions with the additional instruction of commenting why or why not to prevent simple yes or no answers.

Q6. Given what you know from last semester and what you have observed this semester, describe any benefits/advantages of maintaining a course portfolio?

Q7. What personal attitudes or beliefs (if any) of yours concerning maintaining a course portfolio has changed in MA101 as compared to MA100?

Q8. Given your personal experience this semester do you believe it's a good idea for instructors to continue emphasizing maintaining a course portfolio in MA100?

Select the choice that best describes your opinion (comments are encouraged):

Excellent      OK      On the Fence      Bad Idea      See no Real Benefit

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Q9. Given that one sheet of paper is the only authorized reference for all quizzes and exams in MA101, should instructors place more emphasis on maintaining a course portfolio in MA101?

Select the choice that best describes your opinion (comments are encouraged):

Excellent    OK    On the Fence    Bad Idea    See no Real Benefit

Figure 6 captures student responses to questions eight and nine of Survey II. It clearly demonstrates that after almost a semester the majority of students (79.59 percent) still believe that

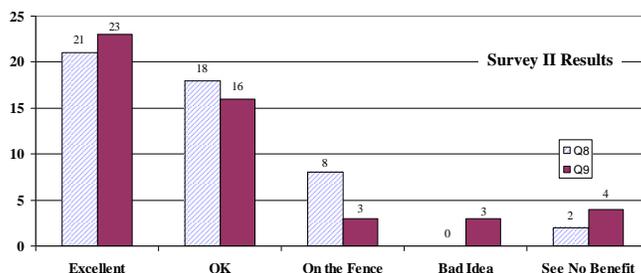


Figure 6 Student Responses to Survey II Questions 8 and 9.

it's a good idea to emphasis maintaining a portfolio in both MA100 and MA101. The comments for question nine stresses the importance organization has since students are only authorized one sheet of paper for all graded events in the course. The vast majority of the comments were favorable to the requirement of maintaining a course portfolio regardless of instructor or final grade in the course. The comments below are taken from the survey and reflect the prevailing thought of most cadet responses.

Q6. "It helps you study by keeping all of your information together."

"A portfolio is crucial for organization, study and success."

"Keeping a course portfolio is great! This semester we can use one sheet for reference of notes. As long as you keep your notebook up all you have to do before a WPR is skim your notes for important things."

Q7. "I try to keep my course portfolio organized still, even though it is not as emphasized. I think course portfolios are a great asset."

"My portfolio has not been as organized and I haven't been getting as good of grades. The material we are learning now is less familiar and it would help me if I had a better notebook."

"My attitude has not changes, I still feel that they are extremely beneficial and I have continued to keep one!"

"I love portfolios! I thought it was very helpful last semester, even more this semester. Staying organized is the only thing that has got me through this course alive."

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In summary, the surveys show that the overwhelming majority of students perceive that their portfolios are beneficial and even crucial to success in the course. It is a wonder that so many actually failed to take full advantage of their portfolios by maintaining them throughout the semester.

### **V Conclusion**

This research has demonstrated that there is some strong quantitative and anecdotal assessment for the use of mathematics portfolios. Despite the lack of a statistical difference between the portfolio and non-portfolio groups, there does appear to be a strong correlation between an organized and complete portfolio and increased student performance at least in course assessments. I acknowledge that there was little to no indication of increased preparation for daily lessons but these may be a factor of the assessment tools. Despite any tangible results, the students strongly believe there is a benefit to be gained from maintaining a mathematics portfolio. This is a crucial first spark and it is incumbent upon us as educators to facilitate its growth into more of a burning desire to develop the portfolio. There were several missed opportunities during this initial implementation that might have provided a better learning experience for the students.

I also believe that there is much room for growth in the actual implementation of the mathematics portfolio. There was little emphasis placed on student reflection before, during and at the conclusion of the semester. I believe an increase in the reflection process will likely reap additional benefits. This first implementation did not provide an opportunity for the student to showcase any of their own work. Each of the assessed elements were what I thought were important to student success. However, to serve as a mechanism for charting student growth through the semester, I believe the student should be permitted to identify pieces that they believe demonstrate their growth.

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## Appendix A

MA100 COURSE NOTEBOOK FEEDBACK	NOTEBOOK GRADE	/ 30
CADET		
<b>GENERAL ORGANIZATION</b>		
	<i>Letter Grade</i>	<b>COMMENTS</b>
<ol style="list-style-type: none"> <li>1. Notebook has an overall organized look to it.</li> <li>2. <b>Neatness:</b> Your binder needs to be in order and neat. This means notes from September come before notes from October. This means that the pages should not be folded, crumpled, nor stained. This means that the pages should not be falling out of the binder. (Get reinforcements if you need them!)</li> <li>3. <b>Completeness:</b> Your binder includes many suggested problems, board problems, graded homework, mini-quizzes, written partial reviews (WPR). In addition to being in order, these items should be fully completed (attempted). This should not be difficult if you have been keeping up with your assignments daily.</li> <li>4. <b>Organization:</b> Generally open to interpretation but at a minimum should include some mechanism to separate all of the above information and a method to quickly find and retrieve information.</li> </ol>		
<b>SUGGESTED PROBLEMS</b>		
<ol style="list-style-type: none"> <li>1. Suggested problems are completed (attempted) and in chronological order.</li> </ol>		
<b>GRADED HOMEWORKS</b>		
<ol style="list-style-type: none"> <li>1. All seven (7) graded homeworks are present.</li> <li>2. Corrections have been made to incorrect problems</li> </ol>		
<b>LESSON MINI-QUIZZES</b>		
<ol style="list-style-type: none"> <li>1. All Mini-Quizzes are present</li> <li>2. Corrections have been made to incorrect problems</li> </ol>		
<b>LESSON BOARD SHEETS</b>		
<ol style="list-style-type: none"> <li>1. All Board Sheets are present</li> <li>2. All problems have been completed (attempted)</li> </ol>		
<b>WRITTEN PARTIAL REVIEWS (WPR)</b>		
<ol style="list-style-type: none"> <li>1. All WPRs are present</li> <li>2. Corrections have been made to incorrect problems</li> </ol>		