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## **AC 2011-487: ELECTRONIC PORTFOLIOS IN ACADEMIC ADVISING, SELF-GUIDED LEARNING, AND SELF-ASSESSMENT**

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# **Electronic Portfolios in Academic Advising, Self-Guided Learning, and Self-Assessment**

## **Abstract**

As part of our undergraduate program's commitment to producing quality engineers who have begun to look beyond entry-level jobs, we have recently launched the Notre Dame Electronic Portfolio (NDeP) project. In its second year in the chemical engineering department, implementation of the program for new sophomores was informed by the pilot year and improved in both scope and execution. We have further collected data at the start and end of these sophomores' first semester to track changes in student perceptions as they relate to many of the desired outcomes of our accredited engineering programs. We have found that this semester marks several changes in opinions of student abilities, importance of specific skills, and availability of university resources.

## **Introduction**

Beginning in the early 90's, portfolios have gained popularity in academic settings and more recently there has been a shift towards electronic portfolios (e-portfolio). "E-portfolios can support student advisement, career preparation, and credential documentation; sharing of teaching philosophies and practices; department and program self-studies; and institutional and program accreditation processes."<sup>1</sup> In addition to student benefits, a variety of institutions have implemented e-portfolios for the added purpose of assessment and accreditation in support of "lifelong learning,"<sup>2-5</sup> a specific criteria for engineering accreditation through ABET<sup>6</sup>.

Our undergraduate program strives to produce engineers who are a step ahead of their peers and have begun to look beyond entry-level jobs. Our primary goals are to improve the educational process outside the classroom and to encourage students to take a more active role in their own personal and curricular development. In order to connect student activities and abilities to the objectives of our overall program, we established a set of "six tools" that we feel are essential for graduates to become successful engineers. Further, we would like to implement a project that encourages our students to make connections among their curricular options and between their students and extracurricular pursuits. Another goal is to add to the department's ability to assess student outcomes as part of our continuous improvement. We feel that large improvements to the educational process can be made outside the classroom, and propose a new electronic portfolio project as a way to assess extracurricular efforts toward departmental goals.

In the fall of 2009, we launched the Notre Dame Electronic Portfolio (NDeP) initiative. Like a traditional portfolio, an electronic portfolio (e-portfolio) is a collection of "artifacts," that serve to tell a personal story, such as one's professional progress or capstone skills. The portfolio serves both as a demonstration of its creator's skills and abilities and as a platform for self-expression. Unlike a traditional portfolio, e-portfolios are virtually limitless in size and considerably easier to configure based on the creator's intended message or audience. There is a wider variety of possible files within an e-portfolio, ranging from text-based documents to images to sounds to video clips, and each file can each have its own security level, intended purpose, and placement with the larger project.

The purposes of e-portfolios can be generalized into two major categories: portfolios for learning (a “workspace”) and portfolios of learning (a “showcase”). In the former, e-portfolios are used to collect and display artifacts as they are created, and in a way can show the creator’s progress over time. These types of portfolios are well-suited to individual courses, and are touted as a way to promote more significant learning of topics.<sup>7</sup> The “showcase” portfolio, on the other hand, is a way to collect and organize artifacts in order to demonstrate the creator’s proficiency with a particular topic or set of skills. Often this type of portfolio displays the best of one’s work, which makes it well suited to assessment.<sup>8</sup> The aim of our initiative is to combine these two major types of purposes.

We hope to achieve three fundamental objectives with this project: (1) engaging students in their own current learning, (2) creating links between different learning experiences, and (3) documenting personal and professional achievements, which can be used by both the student and the College of Engineering for assessment purposes. The e-portfolio can also serve as a tool to make communication between students and advisers more efficient, and to help students formulate short- and long-term plans for their own career development. By prompting students to identify and elaborate on such plans, students can more explicitly determine the resources, experiences, and attitudes necessary to be successful. As a portion of the academic advising experience, NDeP includes a set of surveys designed to help students consider their academic coursework, in which we also have students assess their own progress in the program. The surveys address the ABET accreditation criteria as well as students’ individual goal-setting strategies and awareness of university-specific resources. For each criterion, students consider deliverable proof that demonstrates their current proficiency. These artifacts can be electronically archived in their personal portfolio.

In this paper, we summarize the results of the pilot year of the e-portfolio initiative, including implementation, assessment, and student feedback. We then discuss the modifications made to the program and survey results from the second year. Finally, recommendations and goals for future iterations will be considered.

## **Methods**

The administration site for the current study was a medium sized, Midwestern, private institution with a traditional student composition, i.e. the vast majority of students complete their undergraduate studies in four years and are in the age range of 18-22. The overall student body is 53% male and 47% female, while the College of Engineering is approximately 75% male and 25% female.

In terms of institutional structure, first-year students are admitted to the separate First-Year of Studies program regardless of their intended future major. Students select their major (whether engineering or something else) near the end of their first-year when they register for classes for the upcoming fall semester. With few exceptions, students that are considering an academic pathway within engineering complete a standard first-year curriculum, including the two-semester course sequence “Introduction to Engineering.” They then pass into the college of their selection in their sophomore year. Beginning in their sophomore year and until they graduate, students are institutionally recognized by their college, which, in the case of this study, is the

College of Engineering; and by their specific engineering discipline within. However, beyond admission / selection into the university as a whole, there are no admission or selection criteria for entering any of the disciplines of engineering; rather, it is based on student interest alone.

In the pilot program in the fall of 2009, we introduced NDeP to students as a way to display proof of their progress in their engineering program to date (the showcase portfolio). We chose to implement the project through Google Apps. This decision was made for several reasons: (1) the university employs Gmail as the student email server, so every student already has a Google account maintained by the university; (2) Google accounts provide students a large online storage capacity for documents under the university's domain; (3) Google Apps include the ability to create professional-looking output for student portfolios through both Sites and Docs. Further, the Google Apps suite includes possibilities for incorporating images (Picasa), video (Google Video and Youtube), blogs (Blogger), among others, as portfolio artifacts.

We also summarized the NDeP initiative in its own Google Site that was created to serve as an informational hub for students. This site contained links and documents for the reason, creation, and maintenance of e-portfolios, quick "how-to" guides for navigating the Google Apps suite, and departmental resources such as the program guide, advising handbook, current news, research opportunities, and career information. This site was also developed to house the surveys we would administer to students to aid in conversations with their academic advisors.

Seventy-five chemical engineering sophomores enrolled in our introductory course on material and energy balances were required to complete the e-portfolio project as a homework assignment with one optional resubmit after the portfolio was assessed by course instructors. They were allowed to choose to display their portfolio either as a website or as a PowerPoint presentation. The project statement is available in the Appendix, Figure A1. After the project was implemented, students were asked to offer insights and recommendations for the project in future years.

The fall 2009 e-portfolio consisted of a homepage and six other webpages, one devoted to each of the Six Tools:

1. Analytical and problem solving skills – Strong analytical and problem solving skills and overall technical experience in chemical engineering concepts and principles
2. Definition and understanding of engineering concepts – Ability to define and understand engineering concepts and phenomena in the context of systems that extend beyond the domain of traditional chemical engineering
3. Understanding technical problems – Understanding of technical problems in the broader context of society, including external economic and possibly social factors
4. Communication skills – Strong communication skills (oral and written; listening, comprehending, ability to interact with peers and professors)
5. Creativity and independence – Development of independence and creativity in thought and action, with skills and aspirations such as leadership, teamwork, and entrepreneurship
6. Organizational skills – The personal organizational skills, the sense of personal responsibility and commitment, the initiative, and the ability to self-assess necessary to be a consistently successful professional

As a result of course instructor and student feedback, the e-portfolio initiative was overhauled for the fall 2010 semester. This time, the 55-student section of the same introductory chemical engineering course were required to complete an e-portfolio as a semester-long project worth a more significant fraction of the course grade. All portfolios were created as websites. Rather than presenting the semester project as a way to show proof of progress in engineering, the e-portfolio was demonstrated as a means for improving student ability to more clearly communicate their current skills and abilities to a wider audience, and to use this consideration to make more informed and reasoned decisions about their academic and professional future. Further, instead of being a single assignment with an optional resubmit, the project was now broken into five phases:

1. Creation of a homepage and a brief biography
2. Creation of the six pages for the Six Tools, with reflection on each tool's meaning, personal goals, and self-assessment
3. Addition of electronic artifacts to each of the six pages and updated self-assessment
4. Creation of page specifically written for one's academic advisor
5. Refinement of entire portfolio, discussion of progress toward goals, and further personalization

The project statement for each of the five phases is given as Figures A2-A6 in the Appendix. In addition to the informational Google Site for the NDeP initiative, students were also given links to electronic portfolios developed by Notre Dame staff. These portfolios also contained links to some of the pilot year's portfolios to serve as examples.

## Results and Discussion

Using the official NDeP website, sample portfolios from peers and others, and receiving feedback at multiple stages in the design process, students were able to successfully complete more extensive portfolio projects in the second year than in the first. Student portfolios were formally assessed against the same rubric, made available in advance, in both years. This rubric is in the Appendix as Figure A7. The same instructor evaluated the portfolios in both years. A summary of the average scores for both classes is given in Table 1, below. After applying the respective weights to the six categories, the average score in the 2009 class was 75 points out of 100, while the average score for the 2010 class was 86 out of 100.

**Table 1: Summary of average scores from assessment rubric on student e-portfolios**

<b>Category (weight)</b>	<b>2009 Average (out of 4)</b>	<b>2010 Average (out of 4)</b>
Motivation (20%)	3.15	3.15
Content (20%)	3.16	3.39
Reflection (20%)	2.59	3.35
Organization (20%)	3.26	3.60
Integration (10%)	2.59	3.72
Mechanics (10%)	3.00	3.76

The project scores from 2009 in Reflection (thoughtful and clear discussion of one's strengths and weaknesses) and Integration (connection of various artifacts both to personal abilities and to other aspects of personal and professional life) were major driving factors in the changes to the NDeP project in 2010. By requiring students to write about the six tools and their personal perceptions before requesting electronic artifacts, students were better able to focus on reflection. The final phase of the project in 2010 required students to revisit the portfolio as a whole to ensure that it told a complete story, which likely led to the dramatic increase in Integration scores.

Improvement in other categories observed in the 2010 administration can likely be attributed to a number of changes to the execution of the project: available resources, the relative weight toward the final course grade, the amount of time devoted to the project, the way the project was initially presented to students, and the timing of feedback. Despite specific feedback related to the specificity of future goals and plans, the Motivation score remains the same on average (3.15 out of 4.00), though it is now the lowest category of the six. Organization scores largely increased (from 3.26 to 3.60 out of 4.00) because students were more careful with ensuring their electronic artifacts were accessible and clearly labeled.

New to the 2010 implementation, surveys were administered at the beginning and end of the semester to gauge student opinions and self-assessment as they relate to the Six Tools and to the ABET program outcomes. Students were asked to rate how likely they were to agree to a series of statements related to their knowledge of university resources, confidence in their own goal-setting and plans, and abilities related to being a successful engineer. The complete survey is in the Appendix. Most questions required students to rate how much they agreed with a statement on a scale of 1 (complete disagreement) to 10 (complete agreement). We conducted a two-tailed t-test on 44 samples of survey results from this year's sophomore class at the start and end of the semester and were able to show a statistical change in student opinions in 8 of 41 statements tested on the survey. The results are summarized in Table 2.

The results of this survey can certainly be attributed to more than simply the NDeP project from this semester, though either way it is good to see that students have taken the initiative to better explore their academic and professional options in this semester, and feel more confident in articulating their skills and knowledge. It is surprising to find that most students simultaneously have more confidence in their lifelong learning yet find it less important than before, but it is also interesting to note that original agreement with this statement was quite strong. These survey questions will be administered at the end of the 2010-2011 academic year to further track the opinions of this sophomore class.

We will continue to follow both classes of students through their academic careers at the university to provide further opportunity to improve their e-portfolios. Currently, we are compiling further qualitative feedback data from both classes to make this project more valuable to our students. The work done in our department and independently in our Office of First Year Studies has attracted the attention of the rest of the university, and further support will soon be given to the e-portfolio initiative. In the spring of 2011, an e-portfolio assignment will be given to students in our common first-year sequence to encourage them to retain electronic artifacts early and to further reflect on their skills, abilities, and interests before choosing their major.

**Table 2: Summary of 2010 Student Responses with Significant Change in Answer**

Statement	Mean Response, start of semester	Mean Response, end of semester	Confidence level
I am fully aware of my curricular options as a student of chemical engineering at the University of Notre Dame.	5.95	6.93	99%
I am fully aware of the resources available for my professional development at the University of Notre Dame.	5.59	6.68	99.9%
I am fully aware of the types of employment opportunities available for chemical engineering alumni from the University of Notre Dame.	5.09	6.11	99%
I have complete confidence in my ability to articulate the current state of my engineering skills and knowledge.	6.86	7.41	99%
I have complete confidence in my ability to perform experiments and analyze data.	7.52	8.05	95%
I have complete confidence in my ability to continue learning technical concepts outside the classroom.	7.36	7.73	95%
I consider it extremely important to my long-term plans to develop my ability to solve engineering problems.	9.11	8.61	95%
I consider it extremely important to my long-term plans to develop my ability to use techniques, skills, and tools related to engineering.	9.00	8.50	99%

## Conclusions

The NDeP initiative was created to help improve the educational program outside the classroom and to give students the opportunity to take a more active role in their personal and professional development. In the fall of 2009, we administered a portfolio assignment to all sophomores in our introductory chemical engineering course and obtained feedback from both students and instructors regarding its execution. We found that students had a difficult time writing about their own abilities and integrating their work in a meaningful way, and therefore expanded the portfolio assignment to a longer-term project with more checkpoints for feedback and discussion. During this formative semester in our students' engineering education, we have found that they take time to explore their academic and professional options in chemical engineering at this time, as well as grow in confidence in some engineering skills and their ability to articulate them. We have refined the project to the point that we can administer a preliminary portfolio assignment to all first-year engineering students this spring. The university has recently announced further support for electronic portfolios as tools for learning and assessment at a university-wide level starting in 2011.

## References

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## Appendix

### Instructions:

As discussed in recitation, an electronic portfolio is a collection of “artifacts” that show one’s competency in a number of areas. This portfolio serves as an important professional development tool in terms of self-assessment, collaboration with your academic advisor, and self-promotion when on the job market.

We have suggested presenting yourself in terms of the “Six Tool Engineer”:

- Understanding engineering concepts
- Understanding technical problems in societal contexts
- Analytical and problem-solving skills
- Communication skills
- Organization, initiative, and self-assessment
- Independence, leadership, and creativity

By Friday, October 2, you should have a working version of your electronic portfolio available using Google Apps in your ND space. You may choose to format your portfolio as a slideshow presentation or as a website; templates for both are available in the Electronic Portfolio Items folder on Concourse.

You should submit your website or slideshow directly through Concourse. If you have a working Google site that is available (either publicly or to all of ND), you can simply enter the URL as text in the “submission” box below. If you are keeping the site private, you may use Google Apps to “share” the website directly with Dr. McCreedy ([mim@nd.edu](mailto:mim@nd.edu)), Josh ([jenszer1@nd.edu](mailto:jenszer1@nd.edu)) and Victoria ([vfroude@nd.edu](mailto:vfroude@nd.edu)). If you have a slideshow, you may share it using Google Apps or submit all necessary files through Concourse using “add attachment” below.

Your portfolio will be evaluated in six categories:

- Motivation (20 points):** Is there suitable biography and consideration of future goals and plans?
- Content (20 points):** Is there information from both your freshman and sophomore years at ND?  
Is there more than just material associated with classes?
- Reflection (20 points):** Does each artifact have a careful reflection and consideration for why it belongs in the portfolio? Is each artifact’s reflection specific to that artifact?
- Organization (20 points):** Is the portfolio easy to navigate? Is everything consistent?
- Integration (10 points):** Does it make sense why each artifact belongs in the portfolio? Does the portfolio tell a complete story?
- Mechanics (10 points):** Is the portfolio free of grammatical errors? Is the overall design, color scheme, font selections, etc, professional?

If you have any questions or suggestions to make this project more worth your while, please contact Josh ([jenszer1@nd.edu](mailto:jenszer1@nd.edu)). This project will certainly be ongoing, but we are requiring this portfolio as part of your homework grade to make sure everyone gets started at this point in their career.

Figure A1. E-portfolio assignment for fall 2009

### CBE 20255 Fall 2010 Portfolio Project – Checkpoint 1

There are two small but significant components to the Portfolio Project that are due with Homework Set 3 (must be completed online before 10:00 a.m. on Wednesday, September 8).

The first is to complete the survey that will be sent via the CBE22255 listserv. You must sign into your ND Google Apps account to complete it. All data collected will be kept anonymous, but this is the only way I can determine whether you've actually taken the survey or not. Completion of this survey is required for the project. It is about 40 questions and should take 10-15 minutes to complete.

The second is to create the space that will house your future portfolio. Please create a "front page" for your portfolio that at least includes a mini-biography and why you are currently studying chemical engineering at Notre Dame.

To create your Google Site on the ND space, follow these steps.

- 1) Log into ND Google Apps. To access sites directly, use [gsites.nd.edu](http://gsites.nd.edu), or if you're already logged into Gmail, just choose "Sites" from the list at the top left of the page.
- 2) Click the gray "Create new site" button toward the top of the page.
- 3) Following the prompts on the page, choose a blank template, name your site, and choose a theme (optional). Under "More Options," you may do one of three things:
  - a) Leave the options as is (allows all people with ND accounts to see your site... if they know where to look).
  - b) Check the box for "let anyone in the world view this site." Google will add it to its search engine rather quickly, so be careful.
  - c) Select "Only people I specify can view this site."
- 4) Click the blue "Create site" button.
- 5) Your site is created. Click "Edit page" at the top right to put content into your site (for now, simply words is fine; if you want to play around with embedding images/videos, by all means, do! No HTML knowledge is necessary).
- 6) **If you choose option (c) in step 3**, click "More Actions" on the top right, then select "share this site." Choose "as viewers," then enter the e-mail address [jenszer1@nd.edu](mailto:jenszer1@nd.edu) (and whoever else's you want) into the box. Click the gray "invite these people" button. Enter a message (optional, but helpful) and click "send."

If you have any questions, don't hesitate to contact Josh ([jenszer1@nd.edu](mailto:jenszer1@nd.edu)). Thanks!

Figure A2. E-portfolio assignment, phase 1, for fall 2010

## CBE 20255 Fall 2010 Portfolio Project – Checkpoint 2

This next part of the electronic portfolio is due with Homework Set 5 – it must be completed before Wednesday, 29 September.

By now you have created your Google Site and taken at least a few moments to contemplate yourself and your reasons for considering chemical engineering. You may choose to update/modify this front page at any time.

Now we want to create six subpages to discuss each of the tools of the “Six Tool Engineer.” Note that this is just one way to organize your thoughts and abilities; it just happens to be the way we currently require you to organize some information for this course. I certainly encourage you to do more than this and to not let yourself be confined by the constraints/suggestions here (check out [my personal portfolio](#) for one example of multiple organizations of related artifacts – I effectively have three “sub-portfolios” – Teaching, Research, and this project).

To create a subpage, from your Google Site, click the “Create Page” toward the upper-right (note that you must be logged in if you want to see this option). You may choose which template to use, though I recommend the default “Web Page” for most purposes. Enter a name for this page, change the URL if desired, and select where to put the new page: “top level” or under your main page, as you wish. Then click “Create Page” at the bottom!

Each of these six pages can be modified like the front page. Feel free to add images, links to other websites, or experiment with “embedding” Google Docs, Youtube videos, etc., as necessary. You may choose to adjust your “Sidebar” already; I’ll provide more detailed instructions regarding that in the Checkpoint 3 document.

At a bare minimum, each of these six pages should include, in whatever fashion you choose,

- 1) A personal reflection on what this “Tool” (or set of skills/abilities) means to you.
- 2) Some discussion of your current level of ability with this set of skills.
- 3) At least one (but preferably more) short- or long-term goal/idea related to that set of skills.

You can anticipate three more checkpoints this semester. More detail will be given in future documents.

**Checkpoint 3:** Collect electronic artifacts (documents, photos, videos, web links) to add to your portfolio in support of your reflections. Confirm security settings on Google Docs as necessary. (Due 6 October)

**Checkpoint 4:** Create an “advising page” that summarizes your current plans, goals, concerns, reflections, and questions for discussion with your academic advisor. (Due 3 November)

**Checkpoint 5:** Refine/expand goals and reflections given your current artifacts and your progress in your coursework this semester. Revisit your cover page, create a “end-of-semester reflection,” and upload your most recent resume. (Due 22 November)

If you have any questions, don’t hesitate to contact Josh ([jenszer1@nd.edu](mailto:jenszer1@nd.edu)) at any time. Thanks!

Figure A3. E-portfolio assignment, phase 2, for fall 2010

### CBE 20255 Fall 2010 Portfolio Project – Checkpoint 3

This next part of the electronic portfolio must be completed before Wednesday, 13 October.

At this point, you have a Google Site with a home page and at least the six subpages associated with the Six Tools as discussed in previous classes. We will now focus on populating these pages with links, and modifying your Sidebar as desired to make your site as navigable as possible.

As you created the six tools pages last week, you may have noticed that Google automatically adds these entries to your Sidebar in alphabetical order. That order may be useful for some cases, but chances are you can think of a better organization. So, while logged in, click the “Edit Sidebar” link at the bottom of your sidebar.

This should bring you to the “Site Appearance: Site Elements” page, where you can edit your layout. There are actually a lot of options here – to adjust your page’s header/footer and to add items to your sidebar. I encourage you to explore your options, but for now, click “edit” under Navigation in the Sidebar section. The “Configure Navigation” window opens. Uncheck the “Automatically organize my navigation” box, then select a page and use the arrows at right to rearrange/indent your navigation to your liking. You may use the “add page” link to add links to other pages on your Google site, or “add URL” to add links to pages *outside* your Google site. Click OK (at the bottom) when you’re done, then Preview or Save changes (at the bottom) after that.

Now we want to update your six subpages that discuss each of the tools of the “Six Tool Engineer.” First, you need to collect all the electronic files you have that best display your current abilities in each of the six tools. These may include (but are not limited to)

- Microsoft Office files (reports, presentations, etc.)
- Graphical User Interfaces
- Photos or videos (preferably of yourself, but also to represent organizations/work you’ve been part of)
- Links to websites for associations/past experiences/etc.
- Online blogs/podcasts you contribute to

**Important note:** Whatever evidence you have, make sure it is **yours**. Do not use others’ work without their permission. *If someone has publicly posted his/her work elsewhere, and you had a part in it, you may link to the corresponding place online.* Do not attach/link to material that is confidential in nature.

Then, link to the appropriate documents on each of your six pages. You may choose to “attach” documents at the bottom (self-explanatory, I hope) or to link to or “embed” them in the page (while editing a page, use the options on the Insert menu).

**Important note 2:** if you embed/link to a document, you need to make sure your audience also has permission to see it. This may just be me (for now), or you can set the privacy settings on each Google Document to be open to all of ND or the world (there is also an “intermediate” option of making something public ONLY to those with the link to the document, which is a good option here). To do this, in Google Docs, check the document, then click “Share” at the top of the page to edit the current settings. Either add my e-mail address or change the overall security. Be sure you set it so those with permission can only “view” your document, not “edit” it.

At a bare minimum, each of these six pages should include at least one attachment/embedded file/link, or else some discussion about why there is no link (i.e., what plans you have to gain experience so you can add artifacts in the future). Also, if you have received feedback from me regarding Checkpoint 2, you should address this as well for this Checkpoint.

If you have any questions, don’t hesitate to contact me ([jenszer1@nd.edu](mailto:jenszer1@nd.edu)) at any time. Thanks!

Figure A4. E-portfolio assignment, phase 3, for fall 2010

#### CBE 20255 Fall 2010 Portfolio Project – Checkpoint 4

This next part of the electronic portfolio must be completed before Wednesday, 3 November.

By now, you have a “working” version of the portfolio as it has been explained to date. Organizing your thoughts according to a template like the “six tools” is one way to **showcase** your work, abilities, and plans, but it is only one aspect of a portfolio. We could call this the accountability aspect – as members of the chemical engineering department at Notre Dame, we want to make sure that we are all achieving a certain set of abilities. For the last two checkpoints, we will focus on a portfolio as a “living document,” starting with personalizing your portfolio and turning it into a **workspace**. That is, we want to develop portfolios that help you focus on improvement.

We have had some practice with this already, in the prompts we’ve responded to for self-assessment and goal-setting. Now, it’s time to take this one step further and personalize our portfolios to tell our stories.

For checkpoint 4, you should begin to expand your portfolio so that the “Six Tools” are not the focus, but just one part. Create more pages in your portfolio to help paint a more complete picture of who you are and what you hope to achieve in your time at Notre Dame.

At a bare minimum, for checkpoint 4, you should do the following:

Update your homepage to update your thoughts regarding chemical engineering. If you haven’t already, give a brief biography and also include some discussion about your reason to attend Notre Dame.

Create a “top page” for the six tools if you haven’t already. Explain what this part of the portfolio is and what it means to you. What are the six tools? Why do they matter? What do the subpages show?

Create a page designed specifically for your academic advisor. Now that you’ve taken some time to consider your goals and plans for the future, and in terms of the Six Tools, what do you need to do next semester to accomplish some of those goals and plans? What courses do you plan to take next semester (and beyond)? What electives, concentrations, or minors are you thinking about? Can your advisor provide some insight into your plans for an internship, or study abroad, or research, or something else? Summarize your thoughts from the Six Tools pages. Link to other pages in your portfolio, if it helps. The format of this page is up to you, but the audience is clear: your advisor, who is a busy faculty member (so make sure you are both thoughtful and concise!). How can you make the most of your advising experience?

Initiate your meeting with your advisor when the registration window approaches. Later this month, if your Google Site is private, share it with your advisor. If it is not private, send an e-mail to your advisor with the link to the advising page. Ask them to take a moment to read your reflections before you meet. If you have questions about the department, the discipline, the university, anything, make sure they are known.

**The final checkpoint is just weeks away.** The primary purpose of the final checkpoint is to refine, expand, and reorganize your portfolio so that it is a website you are proud of and can use to continue your personal and professional development. We will focus on collecting thoughts so that you know who you are, so that you are prepared for future academic work, for lifelong learning, and for job interviews. I will provide a pseudo-rubric for this final checkpoint, but your grade will largely depend on your content, organization, and perceived effort.

If you have any questions, don’t hesitate to contact me ([jenszer1@nd.edu](mailto:jenszer1@nd.edu)) at any time. Thanks!

Figure A5. E-portfolio assignment, phase 4, for fall 2010

## CBE 20255 Fall 2010 Portfolio Project – Final Checkpoint

Your electronic portfolio for this semester must be completed before Wednesday, 24 November. (That is, by midnight on Tuesday.)

Recall that our focus is now on a portfolio as a “living document,” starting with personalizing your portfolio and turning it into a **workspace**. That is, we want to develop portfolio pieces that help you focus on improvement.

For the final checkpoint, revisit your goals. You probably have some long-term plans. You may have made some relatively vague goals like “improving skills in X.” But **how** are you going to make those happen? What concrete steps do you have to take to get there? Do you need to make a point to read a certain book? Take a certain class? Do you need to make flash cards and drill yourself on some concepts? Do you have to join a student or professional organization? Or research your options?

You should do the following for this final submission.

Revise your goals in terms of the six tools. Have you made progress in any of them over the course of the semester? How? What are your more specific, measurable steps you plan to take to achieve your goals?

Customize your portfolio so that it is something that works for you. I need you to keep the content we’ve established so far (home page with intro and thoughts on why you are here, overview of the six tools, interpretation/evidence/reflection on each goal, advising page), but can you think of other ways to collect or arrange your thoughts? Maybe you want to call the six tool part your “CBE 20255 Six Tools Portfolio Project” and make way for showcasing projects from future courses. Maybe you want to make the six tools the emphasis of your portfolio and make subpages for specific artifacts. Maybe you want to rearrange ideas so they are chronological. Maybe you want to add pages for your minor or second major or some extracurricular activity. Make this space your own!

Check that your portfolio meets the qualifications expressed on the rubric (see the “Electronic Portfolio Evaluation” file in Concourse). The remaining 20 points for this project will be broken down into 4 points each for Content, Motivation, Reflection, and Organization and 2 points each for Integration and Mechanics. You may assume that “excellent” = 100% of the points, “good” = 75% of the points, “fair” = 50% of the points, “poor” = 25% of the points.

Thanks for your honest and diligent work on this project this semester. I hope that you found it to be a useful tool for exploring your own abilities and desires for the future!

If you have any questions, don’t hesitate to contact me ([jenszer1@nd.edu](mailto:jenszer1@nd.edu)) at any time. Thanks!

Figure A6. E-portfolio assignment, phase 5, for fall 2010

Electronic Portfolio Evaluation Sample Rubric

Quality	Excellent	Good	Fair	Poor
Content	Chosen evidence appropriately and accurately reflects goals, clearly showing understanding of concepts and skills. Content includes examples from several aspects of life.	Chosen evidence is appropriate for given concepts and goals. Content includes examples from both work and personal life.	Chosen evidence reflects goals but may not provide a complete or conclusive understanding of concepts. Content may lack examples from academic, work, or personal life.	Selection of chosen evidence is unclear or insufficient.
Integration	Clearly able to connect pieces of evidence to one another and various aspects of personal and work life.	Makes good effort to connect pieces of evidence and experiences in own life.	Connects some pieces of evidence to goals, skills, or personal experiences.	Makes little to no effort in creating portfolio as cohesive whole.
Motivation	Provides clear interest and future goals and plans with support from provided evidence.	Provides mostly complete evidence of interest or consideration of future goals and/or plans.	Provides some evidence of interest or future goals or plans, but with perhaps a shallow treatment of one or the other.	Provides little proof of interest, goal-making, or planning.
Reflection	Provides thorough evaluation of personal strengths and weaknesses and reasoning for evidence to be included in the portfolio. Reflections are careful and deliberate and specific to each piece of evidence.	Provides appropriate consideration of personal strengths as reflected by evidence and reasoning for inclusion in the portfolio. Reflections are specific to each piece of evidence.	Provides perhaps superficial summaries of strengths and weaknesses, or does not make clear why evidence belongs in portfolio. Some reflection may be repetitive or not evidence-specific.	Provides little indication of effort in reflecting on evidence.
Organization	Portfolio is clean, professional, and easy to navigate. Pages are consistent and logical and show evidence of careful consideration. Files are consistently labeled and stored and are readily available.	Portfolio is mostly neat and easy to navigate. Pages are consistent and show careful effort was applied. Files are consistently stored or labeled.	Portfolio layout is sometimes difficult to navigate. Pages are not very consistent. Some files are difficult to locate.	Portfolio is very difficult to navigate and inconsistent. Files are seemingly randomly stored and labeled.
Mechanics	Portfolio is free of errors in grammar and usage. Selections of fonts, colors, and sizes are professional.	Very few grammatical mistakes in portfolio. Fonts, colors, and sizes do not detract from portfolio.	Some errors in grammar and usage present in portfolio. Fonts, colors, and sizes make parts of the portfolio inconvenient to read.	Several errors in grammar and punctuation. Fonts, colors, and sizes are inappropriate.

Figure A7. E-portfolio assessment rubric

CBE Electronic Portfolio Initiative Survey

The following is a series of statements that pertain to your personal learning, assessment, and goal-setting, largely as it pertains to your engineering studies and future career. Please read the statements carefully; some of them ask similar questions with specific differences. Note that while this survey does require you to be signed into your Notre Dame e-mail account, that this is solely to determine that you have completed this survey. All information and responses will be kept confidential.

Your username (xxx@nd.edu) will be recorded when you submit this form. Not xxx? Sign out

What is your long-term career goal after obtaining your B.S. in chemical engineering? Please check all you are considering.

For the careers you are most seriously considering, give a brief description of why you are interested in this field; what has lead you to pursue chemical engineering to help you toward your eventual career?

Have your career plans changed since you took the survey at the beginning of the semester?

If your career plans have changed since you last took this survey, please explain the reason(s) for this change here.

Please rate how strongly you agree with each statement on a scale of 1 (strongly disagree) to 10 (strongly agree).

I have concrete goals for the upcoming semester.

I am confident that the plans I have in place for the upcoming semester are the best possible for me right now.

I have concrete goals for the rest of my time in college.

I am confident that the plans I have in place for the rest of my time in college are the best possible for me right now.

I have concrete goals for the next five years.

I am confident that the plans I have in place for the next five years are the best possible for me right now.

I am fully aware of my curricular options as a student of chemical engineering at the University of Notre Dame.

I am fully aware of the resources available for my professional development at the University of Notre Dame.

I am fully aware of the types of employment opportunities available for chemical engineering alumni from the University of Notre Dame.

For this next section, please rate your confidence in each of the following abilities. Continue to rate how strongly you agree with each statement as it relates to your ultimate career goals on a scale of 1 (strongly disagree) to 10 (strongly agree).

I have complete confidence in my ability to assess my own personal progress related to my engineering studies.

I have complete confidence in my ability to articulate the current state of my engineering skills and knowledge.

I have complete confidence in my ability to make concrete plans for my future.

I have complete confidence in my ability to select the courses and electives that are best for me.

I have complete confidence in my ability to integrate the content from traditional coursework into my everyday life and career.

I have complete confidence in my ability to apply fundamental concepts from math, science, and engineering.

I have complete confidence in my ability to perform experiments and analyze data.

I have complete confidence in my ability to design products and processes that meet specific needs.

I have complete confidence in my ability to function effectively on a team.

I have complete confidence in my ability to solve engineering problems.

I have complete confidence in my knowledge and application of ethical standards in engineering.

I have complete confidence in my ability to communicate effectively.

I have complete confidence in my ability to put engineering problems in a broader societal context.



I have complete confidence in my ability to continue learning technical concepts outside the classroom.

I have complete confidence in my awareness and understanding of contemporary issues and how they affect my career.

I have complete confidence in my ability to use techniques, skills, and tools related to engineering.

For this next section, please rate your perceived importance of these abilities to your long-term plans. Continue to rate how strongly you agree with each statement on a scale of 1 (strongly disagree) to 10 (strongly agree).

I consider it extremely important to my long-term plans to develop my ability to assess my own personal progress related to my engineering expertise.

I consider it extremely important to my long-term plans to develop my ability to articulate the current state of my engineering skills and knowledge.

I consider it extremely important to my long-term plans to develop my ability to make concrete plans for my future.

I consider it extremely important to my long-term plans to develop my ability to select the courses and electives that are best for me.

I consider it extremely important to my long-term plans to develop my ability to integrate the content from traditional coursework into my everyday life and career.

I consider it extremely important to my long-term plans to develop my ability to apply fundamental concepts from math, science, and engineering.

I consider it extremely important to my long-term plans to develop my ability to perform experiments and analyze data.

I consider it extremely important to my long-term plans to develop my ability to design products and processes that meet specific needs.

I consider it extremely important to my long-term plans to develop my ability to function effectively on a team.

I consider it extremely important to my long-term plans to develop my ability to solve engineering problems.

I consider it extremely important to my long-term plans to develop my knowledge and application of ethical standards in engineering.

I consider it extremely important to my long-term plans to develop my ability to communicate effectively.

I consider it extremely important to my long-term plans to develop my ability to put engineering problems in a broader societal context.

I consider it extremely important to my long-term plans to develop my ability to continue learning technical concepts outside the classroom.

I consider it extremely important to my long-term plans to develop my awareness and understanding of contemporary issues and how they affect my career.

I consider it extremely important to my long-term plans to develop my ability to use techniques, skills, and tools related to engineering.

#### Upcoming Courses

Please answer a couple questions about your academic plans for Spring 2011.

Please list the courses that you plan to take in Spring 2011.

Please explain the rationale for the electives/core requirements (i.e., courses that are not specifically required for your major) you have chosen to complete in Spring 2011.

Please answer the following series of questions related to the electronic portfolio project that you completed this semester. Please rate how helpful an electronic portfolio is to each of these items on a scale of 1 (not helpful at all) to 10 (very helpful).

How helpful was the creation of an electronic portfolio in identifying your personal strengths and weaknesses?

How helpful was the creation of an electronic portfolio in helping with honest assessment of your own abilities?

How helpful was the creation of an electronic portfolio in discerning your skills needed for your future career?

How helpful was the creation of an electronic portfolio in setting goals and plans?

How helpful was the creation of an electronic portfolio in integrating past courses to future learning goals?

How helpful was the creation of an electronic portfolio in understanding what the discipline of engineering is?

How helpful was the creation of an electronic portfolio in organizing material from courses?

How helpful was the creation of an electronic portfolio in developing digital and online skills?

Had you ever created a portfolio (electronic or paper) before this semester?

What resources did you use to help complete your electronic portfolio?

What should be done to improve the ePortfolio assignment? For example, consider the number/order of the checkpoints, the clarity of individual assignments, the amount of freedom or templating, etc.

What was the most difficult part about the eP project?

Please comment specifically on the ease or difficult of using Google Apps (Docs, Sites, etc.).

What could be done to make it easier to work with them?

How could the electronic portfolio project be made more useful for you?

Since we feel the "Six Tools" are vital to producing a well-rounded engineer, please comment on ways that mapping your learning to these tools was helpful.