Work in Progress: Using ePortfolios to Showcase Student Projects

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***Abstract* - An ePortfolio is a collection of personal work on a website that can be used by students to showcase their work as a supplement to their resume. The authors propose to include creating such an online ePortfolio as a part of an introductory freshman-level course where students start building them. As they progress in their major, more skill sets/projects developed in the later academic years can be added. ePortfolios can be a very effective way for students to market their talent to potential employers and even to graduate programs. The process of creating an ePortfolio can aid in increasing engagement of students in their learning process and encourage them to take responsibility for their work. The creation of the ePortfolio itself also develops skills such as website creation which add to the student's personal and professional development. As the authors teach mechanical engineering, they have implemented this idea in junior/senior level mechanical engineering courses that teach students Computer Aided Design and Computer Aided Engineering, but this can be implemented in any major. Also, a freshman class, such as a Fundamentals of Engineering Design class, where they do a cornerstone design project, would be more appropriate to introduce such an idea. This way the students can start early and build a comprehensive ePortfolio by the end of their undergraduate degree. It would also help them to make connections among courses as well as between theoretical and real-life problems. In this work-in-progress paper, we will share details about these ePortfolios, a few examples created by our students, and some quantitative and qualitative feedback received from students about them.**

Index Terms – ePortfolios, Digital Resume, Showcase Student Work Online.

INTRODUCTION

Portfolios have been long used by artists and professionals in the architecture field as a collection of creative work that can be used to demonstrate one's proficiency in certain skill sets and to seek further work. An ePortfolio is on the same lines, but it is an online collection of an individual's work [1, 2]. For engineering students, this could be used as a great opportunity to demonstrate their understanding of technical concepts by showcasing key engineering projects or work experiences that they have done for various courses across their curriculum or as part of their internship experiences. The process of creation of the ePortfolio helps students to take ownership of their work and reflect upon it, thus providing a context to what they have learned in their academic life. This also encourages them to take responsibility for their work [3, 4]. ePortfolios offer several advantages: they are easily accessible, they allow the students to start building and shaping their professional online identity, they can be tailored by students according to their preferences, they can also motivate students more than paper-based ones [5]. In the engineering profession, it is not uncommon for the employers to have an expectation for the students to have an ePortfolio documenting the projects and problems they have worked upon. Developing it with creativity and diligence can aid in setting a student apart from others while providing a learning resource. Creating ePortfolios may also pose some challenges, as they often require use of software and online website creation tools which the student needs to be comfortable in using in order to be able to create these ePortfolios. This task of website creation demonstrates the professional readiness of the students to the employers as students' exhibit knowledge and skills, and engage in experiences, necessary for professional and personal growth.

Takin this into account the authors, who teach Mechanical Engineering (ME) courses based on Computer Aided Design (CAD) and Computer Aided Engineering (CAE)/Finite Element Analysis (FEA), have had students create ePortfolios in their courses for past two semesters. The goal of this paper is to describe how ePortfolios were implemented in these courses, show some student developed ePortfolios and describe students' perspective on them. The following sections discuss these in detail.

IMPLEMENTATION IN COURSES

Components and assemblies are often designed as three-dimensional (3-D) models and analyzed using CAD/CAE tools such as Creo, SolidWorks, ANSYS etc. However, the student work is usually communicated on resumes in form of a list or a description of these projects and assignments. This leads to a loss of a lot of details that 3-D models and high definition (HD) rendered images can provide. Use of 3-D models, images and supporting contextual information in ePortfolios enables an individual to examine the design work in detail. Thus, students in our courses were encouraged to

design an ePortfolio with their projects and share this ePortfolio link on their resumes.

Even though this idea has been implemented in ME courses, the concept is general enough to be implemented in a wide range of programs and courses. Currently, we have applied the concept in junior/senior level courses for two semesters. Students were asked to create an ePortfolio by uploading at least 50-60% of their assignments and projects to it. The exercise was not mandatory, but students were offered an extra credit incentive to do it. Majority of the students in each course created an ePortfolio. Eventually, it is planned to be made as a mandatory exercise which will contribute to up to 10% of the overall grade. Based on the feedback from students, we have been continuously working towards creating and improving the learning resources for an ePortfolio creation, such as creating tutorials for website development etc.

The long-term goal is to expand this idea from course level to the program level and have students create ePortfolios starting from their freshmen year. Our ME freshmen students work on a reverse engineering project where they take apart a mechanical object/assembly, take measurements on it and design each component in a CAD software and then assemble it within the CAD software. An ePortfolio development can be started at this stage and more projects/assignments can be added as the student progresses in their major. For example, a Mechanical Engineering student can showcase projects done in fluids mechanics, heat transfer, mechanical system labs, and their final capstone project. This would also help them to make a connection among courses as well as between theoretical and real-life problems. The example is for an ME student, but as mentioned earlier this idea could be used as well in any major.

SOME EPORTFOLIO EXAMPLES

Students used free website builders such as Google Sites, Wix, Weebly etc. to build their ePortfolios. A few samples of student ePortfolios are given below as hyperlinks:

ePortfolio 1 [6]

ePortfolio 2 [7]

ePortfolio 3 [8]

ePortfolio 4 [9]

ePortfolio 5 [10]

The student who created the first ePortfolio has not only used his ePortfolio to showcase his CAD/CAE projects, but also other projects done in various classes including his senior capstone design project. The student who created the second ePortfolio went to a top-ranked graduate school for pursuing his MS in Aeronautical Engineering and is continuing to use his ePortfolio to showcase projects done as part of his graduate classes. The last three links show other good student samples.

FEEDBACK FROM STUDENTS

A post-course survey was conducted to gather student thoughts and feedback on the idea of ePortfolios. This survey was only sent to those students, who opted to make an ePortfolio, and out of that lot, 28 responded to the survey. The students were asked to pick a number from 1-5 (representing strongly disagree to strongly agree on a Likert scale) that best characterizes how they feel about the statements described in Table I below.

TABLE I
SUMMARY OF ANSWERS TO SURVEY QUESTIONS

QUESTION	AVERAGE SCORE (1-5)
ePortfolio helped me market my talent to potential employers and/or to graduate programs.	4.03
ePortfolio provided me an opportunity to demonstrate my understanding of technical concepts by showcasing key engineering projects I did for various courses across the curriculum.	4.16
The creation of ePortfolio helped me to develop skills such as website creation which adds to my professional development.	4.1
ePortfolio helped me in making a connection among the courses I have taken.	3.83

Table I summarizes the results of the survey. As seen from the results, an average score of about 4 was reported for all categories. The above statements show that the students really think ePortfolios helped them in marketing for employment and gave them an opportunity to illustrate their mastery in technical skills learned in their academic life.

In addition to the above, students were also asked for feedback to improve the activity or general comments about ePortfolios. Few of these feedback comments are mentioned below-

- I put a fair amount of effort into making mine look professional. I was able to add it on a job application and it was referenced during the interview. I wouldn't have made one if not for this class. I'm glad I did.
- This was a great idea and I feel that the things I learned in this course will stay with me beyond my undergraduate career. Thanks for everything!
- ePortfolios should be added to the curriculum, it provides a great interactive class summary. Other students could take advantage of this great feature.

Overall, this has been a great experience and I plan to use it for job interviews and even for career fairs.

- Final product displays how the class was a success and how you progressed, giving you a feeling of satisfaction.
- ePortfolios were a good add-on to the course as it allowed me to place my work in one spot. It also forced me to think about the process I took to make certain parts and assemblies which gave me a better understanding of CAD/CAE programs. I haven't yet but will most likely in the future use this ePortfolio to show potential employers what I know.
- ePortfolios should always be a part of all CAD classes.
- Great idea to create ePortfolio! You can include a web-link on your resume and it goes directly to the website designed by you. I have mine broken down into each sub-program and specific examples in each to showcase my ability to use these systems effectively.
- It can be improved by adding a general guideline for students to follow.
- Make half of it due in the middle of the semester and the second half at the end of the semester. Many students (including myself) tend to put something like this off to the last minute and it lowers the quality of our portfolios. Although it is a students' responsibility to do it in a timely fashion, many students work better when there are more prompt deadlines.
- Showing past examples might have been nice.
- Perhaps dedicating a class in starting up. There was a learning curve and getting a proper format was a hassle.

Some constructive feedback (like the last few comments above from the first offering) was also received which helped us improve the course in the next offerings. A good portion of one lecture early in the semester was dedicated to showing how to create a basic website and also showing some student samples from past offerings. Another mid-semester session was done to check on the progress of the students and answer any questions.

SUMMARY

In summary, ePortfolios are a great tool and provide an opportunity to students to effectively showcase themselves as well as their work including accomplishments and achievements on a web portal. It can act as a digital resume supplementing their paper resume which reflects that the student has an ability to communicate effectively. The authors have implemented these in upper division undergraduate classes, but propose to expand this from course level to program level. It can be started in students' first year at college itself such that it can also be a tool for tracking academic growth and helping students make a connection between courses and self-reflect on their education.

REFERENCES

[1] *Barrett, H. (2007). Researching Electronic Portfolios and Learner Engagement: The REFLECT Initiative. Journal of Adolescent & Adult Literacy, 50(6), 1936-2706*

[2] *Beckers, J., Dolmans, D., & Van Merriënboer, J. (2016). e-Portfolios enhancing students' self-directed learning: A systematic review of influencing factors. Australasian Journal of Educational Technology, 32(2), 2.*

[3] *Kunnari, I. & Laurikainne, M. (2017) Collection on Engaging practices on ePorfolio Process, Hameenlinna, Pub. HAMK*

[4] *M. do Rosário Rodrigues, A. L. O. Pires and A. M. Pessoa, "Higher education students' perspectives on the use of ePortfolios.: An exploratory study in the context of the Degree in Basic Education," 2017 International Symposium on Computers in Education (SIIE), Lisbon, 2017, pp. 1-5.*

[5] *Driessen, E. W., Muijtjens, A. M. M., van Tartwijk, J., & van der Vleuten, C. P. M. (2007). Web- or paper-based portfolios: is there a difference? Medical Education, 41(11), 1067-1073.*

[6] *Joseph M. Santaniello E-Portfolio - Reports and Projects," Google Sites. [Online]. Available: https://sites.google.com/njit.edu/santaniello/reports-and-projects?authuser=0. [Accessed: 06-Apr-2018].*

[7] *"Engineering projects," Michael Filippidis. [Online]. Available: https://sites.google.com/view/michael-filippidis/home?authuser=1. [Accessed: 09-Apr-2018].*

[8] *"computer aided design (cad)," Fernadez Mbah Eportfolio. [Online]. Available: https://sites.google.com/njit.edu/fernadezeportfolio/home?authuser=0. [Accessed: 09-Apr-2018].*

[9] *"CAD/CAE Portfolio," Jimmy L. Pang. [Online]. Available: https://sites.google.com/njit.edu/jp547/home. [Accessed: 09-Apr-2018].*

[10] *"Portfolio," CAD Portfolio. [Online]. Available: https://sites.google.com/njit.edu/me430-kevin-oconnor-portfolio/portfolio. [Accessed: 09-Apr-2018].*

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