

First-Year Experience in Construction Education

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Students enter the University with many ideas about their ultimate academic and career goals. The pressures are many with parents and peers strongly influencing them. The newness of separation and the uncertainty of success surround them like at ship at sea. The Building Construction Department at Virginia Tech University has implemented a First-Year-Experience as part of the University's Quality Enhancement Plan. The purpose of this initiative is to actualize first year student's critical thinking processes by incorporating problem-solving, inquiry, and integration into the construction curriculum's two first year semester courses. Partnerships with University curricula and co-curricular groups have been forged and will be used to support student assignments in deliberate actualizations of their academic and career goals. Preliminary findings indicate that 1) students are recognizing their unique status, 2) career foci are viable mechanisms for incorporation of personal and academic strengths, and 3) academic content is shifting with other demands but as the course progresses there is an awareness of how better assignments can be developed that incorporate content and the experience.

Key Words: Construction Education, First Year Experience, Freshman Learning Communities

Introduction

As a result of teaching architecture, engineering, and construction students for over fifteen years one conclusive observation is that students majoring in Construction are typically more assertive, risk taking, action oriented individuals who learn more by doing than by thinking. These students are self-reliant, optimistic of success against overwhelming odds, slow to request help, and often fail to see the connection of classroom teaching/learning with real world situations. Research in emotional intelligence of professional constructor's supports these observable characteristics noting particularly strong scores in optimism, independence, assertiveness, reality testing, and stress tolerance (Darnell, 2003, Walker, 2011). At Virginia Tech this has resulted results in disengagement with the learning process, lower grade point averages, lower rates of student retention, higher rates of academic probation, and ultimately transfers out of the curriculum. A First Year Experience (FYE) initiative was implemented in the Building Construction (BC) Department at Virginia Tech (VT) to nurture and support the incoming freshman to learn how to think (critically) and how to utilize their strengths for academic and career success.

The First Year Experience, or Freshman Seminar, can trace its roots to an administrative response to student unrest at the University of South Carolina during the late 1960's (Watts, 1999). While the program has since been instituted across many American colleges and universities, it has evolved into a more pro-active, supportive approach which helps students prepare for the transition from high school to college. The Freshman Seminar is typically presented as a stand-alone course of varying durations from two weeks to a full academic year. VT had begun implementing the program through many of its colleges in 2010. This effort is a direct aspect of the University's Quality Enhancement Plan (QEP) as a component of the Southern Association of Colleges and Schools- Commission on Colleges (SACS-COC) Reaffirmation of Accreditation process. From the University's perspective the 'Pathways' initiative is designed to provide a foundation and support system allowing students to discover and explore curricular and co-curricular opportunities that can engage them as learners and ultimately as citizens. The BC Department was successful in securing a grant to implement a "Pathways to Success" program for incoming freshman in 2011. The Pathways to Success in Building Construction program is designed to assist and engage the first year student's transition into a male populated (+/-92%), rigorous calculus/physics/engineering based academic program with few self-selected electives. The proposed FYE is a two semester integrated focus

within the introductory courses specifically aimed at catapulting student's strengths into self-directed but guided metacognitive growth.

Literature Review

The assessment of required competencies for construction management students has been the focus of research from several perspectives over the history of the ASC. Many current papers cite the Mead research from 1994, which gained a consensus input from 30 constructor level experts to identify the skills needed for constructors in the 21st century. The key areas relative to the relevant industry forces of globalization, management and finance, and environmental impacts were communication skills, business management and leadership. It should be noted that the definition used for communications skills included not only the ability to communicate on the phone, in writing and in person, but also the ability to resolve divergent interests through negotiations and working with diversity (Mead 1994). Research with a larger population sampling (206 contractors across 36 states) confirmed the importance of problem solving and decision making as the key "duty" which is vital to professional constructors (Hauck 1996).

More recent research within individual construction management programs takes in the perspective of construction management alumni, faculty and industry recruiters. Surveys administered at a career fair identified ethical issues, problem solving skills, and interpersonal skills to be significant competencies for construction graduates (Ahn et al. 2010), while common personal competencies mentioned in interviews of alumni were time management, conflict management and initiating change (Lee et al 2011). The deficiency from these skills has been documented with incoming freshman, where over 60% of students surveyed lacked the necessary learning and studying strategies of attitude, time management, and study aids to make the successful transition from High School to University (Bernhold 2007). The First Year Experience program is designed to learn and practice these skills for a more effective college learning experience, and a smoother transition to work in industry.

The need for these personal competencies is supported by the ACCE accreditation, and is reflected in the requirement for the integration of oral presentation, technical writing, and business management in at least 33% of the total number of Construction and Construction Science courses. In support of this requirement, the ACCE states that: "Construction is concerned with people and their relationships. Thus, the ability to communicate, both orally and in writing, and the understanding of human behavior are essential assets to the constructor. (ACCE eff. 2012)"

The BC FYE program at VT adopted this approach by incorporating the FYE exercises as part of the Introduction to Building Construction course. First Year Experience research further identifies that teaching information literacy and critical thinking to freshman undergraduate students can be more successful if these concepts are demonstrated to be meaningful and valuable in the context of students' daily lives (Sugarman and Mosby 2002). Yet a survey of literacy education for FYE did not identify any programs which had degree specific assignments (Boff and Johnson 2002), which is not surprising due to the general education nature of most FYE programs. The BC Department has directed all FYE assignments and reflections toward degree and career specific foci.

The reflective learning approach used in the FYE program draws from a number of learning theories, including constructivism, action and experiential learning. It develops students' capacities for self-directed learning and adaptive expertise. In his seminal work on educating for critical consciousness, Freire proposes that combining action and reflection results in *praxis* – a set of practices informed by reflection, which, in turn, helps guide future actions to be less random or haphazard and more informed or deliberate (Freire 1973). This was demonstrated in a recent case study of a university FYE program, which introduced the core activities of action and reflection by means of the ePortfolio process. Comparison testing before and after the program identifies a significant gain in the students' capacities to identify, demonstrate and adapt knowledge gained within/ across different contexts (Peet et al. 2011). These skills are particularly relevant to the complex environment of construction, with continuously changing materials, regulations, and delivery processes. Education can best prepare the students by facilitating their learning of skills in problem solving, inquiry and integration, which can then be applied to the challenges presented in the workplace.

FYE Program Description

The VT Pathways to Success program is unique in several aspects. Nationwide, the FYE course, or Freshman Seminar, is more typically administered on a campus wide level, independent of the specific degree fields. VT has chosen to administer this within specific departments. The BC Department has taken this opportunity to develop a two semester specific FYE assessments and assignments focused on the construction industry. Based on the author's initial research, a construction specific FYE program seems unique among ASC member programs. This unique approach allows for a very high level of tailoring the program to learning and reflection applied to career success in construction.

The stated intention of the FYE in the BC Department's program is the intention to engage students to 1) think about doing, 2) do what they are thinking, and 3) reflect upon thinking and doing. The FYE implementation goal is to approach 'whole student' growth through a four part strategy: 1) students identify their strengths; 2) they create a self-directed learning plan addressing their strengths; 3) learn about their strengths and how they relate to others and their success; and 4) reflection. This strategy is consistent with the stated objectives of the University's Pathways to Success program that has the focus of life-long learning through Problem Solving, Inquiry, and Integration, and are reflected in Appendix A as course activities.

Students will initiate the course using the *StrengthsQuest* inventory as the basis of inquiry based exercises linked to their academics and career aspirations. This is coupled with readings and reflections using the University's Common Book, *This I Believe II*, as a starting point for personal insight and the use of ePortfolio to record and retain reflections. Supporting the basic strategy above and their *StrengthsQuest* inventory, students will be engaged with campus resources, including Career Services, the Center for Academic Enrichment & Excellence, and University Libraries. During Fall and Spring semesters students will attend presentations, tours, and study sessions created specifically for BC students. Due to cultural stereotyping and the lack of diversity within the curriculum and the construction industry an additional focus and engagement area will specifically target gender integration within the construction industry. Each of these activities will be reinforced with an academic inquiry or reflection.

Program Implementation

The Pathways to Success in the BC Department's program is being implemented as part of the existing two semester introductory sequence. The majority of the course will be taught in the regular lecture/lab format, with select class modules devoted to the BC FYE objective of full student engagement. The program will involve the entire entering 2011 freshman BC class.

Partnerships

The program has partnered with two departments within the Division of Student Affairs: Career Services and Residence Life. First-year students enrolled at VT in the Fall will complete the *StrengthsQuest* inventory. The department is partnering with University Residence Life also in their use of the *StrengthsQuest* assessment with specific on-campus residents and resident advisors. This partnership is intended to introduce BC students to other students who are learning about their strengths. The entering freshman class of BC students was placed into the same Residence Hall as other new students to instill a sense of community while allowing the partnership to connect the academic and residential sides of campus.

During the Fall semester, students will attend a presentation on basic Career Services support followed by an inquiry problem and ePortfolio reflection. This presentation may be in the form of a class tour of the Campus Career Center or an in-class presentation by a Career Service representative coupled with a presentation on creating a resume and searching for a summer internship followed by resume development. Additionally the program is proposing a Curriculum for a Liberal Education (CLE) strand that should allow students an opportunity to expand particular passions for learning. This is directed at invigorating and instilling a desire for lifelong learning. These Career Service sessions and academic exercises will help students develop their own self-directed CLE in addition to preparing an academic/career linkage in anticipation of attending the Spring Construction Career Fair with the intent of securing an internship.

The partnership with the Women's Center is based on the fact that building construction is a predominately male dominated field. Proposed actions will address the fact that more females are entering the construction industry and how men and women interact in the classroom and in the field. A staff member in the Women's Center has led one class discussion about women working in male dominated fields, followed by an inquiry exercise in gender based stereotyping and discrimination with reflections entered into ePortfolio.

The Introduction to Building Construction FYE component will partner with the University Librarian to acclimate the first-year students to the university library system. At the start of the semester students will attend physical and virtual library tours followed by sessions and problems that will engage these students in performing content domain centered research utilizing library resources. This will be followed by ePortfolio reflection.

In addition to our collaborative relationships with departments in the Division of Student Affairs and the University Libraries, the program will also leverage the academic support services offered through the Center for Academic Enrichment and Excellence (CAEE). Many of the building construction students struggle with the mathematics and science courses that are pre-requisites to upper level courses in engineering. A weekly study group/study tutoring session has been designed and implemented specifically for these first-year students, within their residence hall (off-campus students are also accommodated) to allow them to get assistance in their required engineering calculus math courses, and to also help them become familiar with additional tutoring options.

Assignments and Learning Outcomes

The tracking of assignment and learning outcomes is part of the reflective learning process, and the need for specifying and documenting student learning outcomes has also been addressed in the revisions to the ACCE accreditation (ACCE eff. 7/12). The FYE learning outcomes were organized per Appendix A, which shows the organization of the key categories of learning outcomes with related learning indicators, sample activities and assessment strategies. This conceptual framework was the basis of course assignments, and reflection exercises. The assignment's submittals are mapped from the academic portal to a two column matrix on each student's ePortfolio site. The ePortfolio sites will be developed in the Spring semester, but the recognition of the permanency and public accessibility to these assignments is intended to motivate students to produce high quality work. The ePortfolio web portal will provide the student with a longitudinal reflection extending over the duration of the students university education.

Preliminary Findings

The program has been underway for one semester and has achieved several excellent starting points, notably the *StrengthsQuest* assessment (Appendix A), class and course specific tutoring, introspective career considerations, and initial recognition that deliberate actions have a strong impact on desired outcomes. There have been some scheduling challenges, first in trying to arrange the academic content and the FYE content within the current five hours/week available time frame.

StrengthsQuest is a professional assessment program that allows professionals and students to assess and rank their strengths. The Strengths Assessment, is 177 question, 20 minute online assessment being taken by all faculty and first-year students. Faculty Strengths are posted outside faculty offices for all students to see. Typical *StrengthsQuest* questions are of a continuum type with polar anchors at each end along the lines of "I read instructions carefully" versus "I like to jump right into things," or "I like to work alone on projects" versus "I like to work as part of a team." Internally the results of the *StrengthsQuest* are still being evaluated and analyzed but the initial reaction of the students is that this activity has given them insights into themselves that they were unconsciously aware of but are now more precise and lucid in their self-understanding. As part of the student activity each student was asked to have three external sources receive, review, and comment on their strengths. This was done to allow the student to see beyond themselves and validate the insights gained. This was followed by a reflection assignment. There has been some excitement generated by the Quest. A formative survey will be undertaken in the Spring semester to identify alignment issues and secure student feedback.

Tutoring was slow to get started but has since taken hold, and the fact that the sessions are located within the Residence Hall where over 80% of the students in the class live is being recognized by the students as beneficial. There has not been any polling of the students to determine at what level this is beneficial, but an effort will be directed during the Spring semester.

Introspective career reflection is being processed, with initial insights into which skills work best in what careers. The intent is to marshal this insight with class discussions as more knowledge and understanding of the various roles, responsibilities, and personal characteristics becomes better understood. The students have been provided an assignment, this semester, to develop resumes and to enter into discussions with a minimum of four companies at the Fall career fair: one within their area of interest, one self-performer, one company outside their interest, and a company of their choice. The results and insights of this endeavor will be included in a rewrite of this paper.

Deliberate actions bring deliberate results is a topic that is recurring in discussion. Consciously making choices in what courses to take, what companies to interview, what career and academic decisions to make is a theme that the class is addressing. Thinking about what you are doing and doing what you are thinking about is a prime focus and is intended to be followed up with by select readings from the University's Common Book and ultimately reflections that are aimed at raising consciousness of individual action or inaction. To survive in the world you must learn to pump your own gas.

Content management within the allowable time frame is a challenge that is still being wrestled with and has caused minor academic content shifts to the second semester. This is a result of initially being optimistic about what could be covered and how it could be woven into the course fabric. As time passes, it is becoming more evident how and where content can be plugged into the topical content and used to its best advantage. The intent is to awaken the student that has entered the University with excellent grades but has not often been asked what they think about a variety of activities, their decisions, their actions, and how making choices are decisions that impact their academic and professional futures.

Conclusions

The ultimate objective of the First Year Experience is to assist and nurture our first year students as they learn how to think (critically) and to help them discover how they can utilize their strengths for academic and career success. One of the desired outcomes is to incubate critical thinking skills with a lifelong learning outlook. Stimulating and maintaining a quest for knowledge is the desire of all academic programs. In order to do that, it is imperative to understand our students and act upon the students' strengths to help them actualize their academic and professional growth. In many ways, "a college degree has in many ways become what a high school diploma became 100 years ago - the path to a successful career and to knowledgeable citizenship" (Association of American Colleges and Universities 2002). If we as academics wish to change the way our students think we must be aware of who they are and how they matriculate through the University. Results (noted below) from a recent survey by Arum and Roska (2011) of over 2300 university students at 26 institutions reveals a discouraging deficiency in how we prepare and ultimately graduate our students, many without critical thinking skills.

- 45% demonstrate no significant improvement in a range of skills—including critical thinking, complex reasoning, and writing—during their first 2 years of college.
- 36 % did not demonstrate any significant improvement in learning over four years of college.

It is the belief of the authors and the University that First-Year-Experience programs will make a difference in student academic and professional success.

References

Ahn, Y.H., Kwon, H., Pearce, A.R., and Shin, H. (2010). "Key competencies for U.S. construction graduates: an exploratory factor analysis." *ASC Proceedings of the 46th Annual International Conference*, Boston, MA.

American Council for Construction Education (ACCE). (eff. 7/2012). Document 103: standards and criteria for accreditation of post secondary construction education degree programs. San Antonio, TX: URL <http://acce-hq.org/documents.htm> (retrieved 2011, Oct. 27).

Arum, R. and Roksa, J. (2011). *Academically adrift: limited learning on college campuses*. University of Chicago Press.

Association of American Colleges and Universities. (2002). *Greater expectations: a new vision for learning as a nation goes to college*.

Bernold, L. E. (2007). Preparedness of Engineering Freshman to Inquiry-Based Learning. *Journal of Professional Issues in Engineering Education and Practice*, 133(2), 99-106.

Boff, C. and Johnson, K. (2002). The Library and First-Year Experience Courses: A Nationwide Study. *Reference Services Review*, 30(4), 277-287.

Darnell, G.B. (2011). *How emotional intelligence can maximize people skills and maximize your profits*. 3rd edition. BDI Publishers, Atlanta.

Freire, P. (1973). *Education for critical consciousness*, (3rd Ed), New York: Seabury Press.

Hauck, A.J., and Rockwell, Q.T, (1996). Desirable characteristics of the professional constructor, the initial results of the constructor certification skills and knowledge survey. *ASC Proceedings of the 32nd Annual Conference*, Texas A&M University - College Station, TX.

Lee, N., Ponton, R., Jeffreys, A.W., Cohn, R. (2011). Analysis of industry trends for improving undergraduate Curriculum in construction management education. *ASC Proceedings of the 47th Annual International Conference*, Omaha, NE.

Mead, S. P. and Gehrig, G. B. (1994, September). Skills for the 21st Century: What Constructors Need to Know. *The American Professional Constructor*, 18(3), 8-11.

Peet, M., Lonn, S., Gurin, P., Boyer, K.P., Matney, M., Marra, T., Taylor, S.H, and Daley, A., (2011). Fostering integrative knowledge through eportfolios. *International Journal of ePortfolio*, 1(1), 11-31.

Sugarman, T., and Mosby, A. P. (2002). Making a weak link stronger: incorporating information literacy into a semester-long freshman seminar. *Georgia Library Quarterly*, 39(2), 12-16.

Walker, B. (2003). *Emotional intelligence within the A/E/C industry: a step toward effective collaboration*. Unpublished master's thesis, etd-06112003-144336, Virginia Tech Library System, Blacksburg, VA.

Watts, E. (1999). *The freshman first year experience, 1962-1990: an experiment in humanistic higher education*. Unpublished doctoral dissertation, Queen's University, Ontario, Canada.

Appendix A – FYE Learning Outcomes and Assessment Matrix

Learning Outcomes	Learning Indicators	Sample Activities	Assessment Strategy
1.0 Problem Solving	1.1 Define a problem Ex1. What are my top 5 strengths? Ex2. What courses do I want and need to complete for my major?	Ex 1. Complete <i>StrengthsQuest</i> inventory online. Ex 2. Review course requirements and complete Pathways Planner.	Ex 1. Students will reflect their Top 5 strengths on ePortfolio “blog.” Ex 2. In addition to completing the Pathways Planner, write a reflection on why chose certain CLE courses to complete Area 2, 6, and 7.
	1.2 Identify problem-solving strategies.	Ex 1. Determine academic advisor and schedule a meeting with advisor.	Ex 1. Document an advising meeting in ePortfolio page. Meet with an advisor, and document in ePortfolio.
	1.3 Propose solutions/hypotheses.		
2.0 Inquiry	2.1 Select a topic of inquiry.	Ex 1. Research various career opportunities in Building Construction and select a career/position to aspire	Ex. 1. Assess student research project paper and class presentation. Ex. 2. Assess weekly student research blog thru ePortfolio.
	2.2 Access and evaluate existing knowledge, research, and/or views.	Ex 2. Attend the Fall and Spring Construction Career Fair; inquire about construction careers in addition to career research using the university library resources.	
	2.3 Use information effectively, ethically, and legally to accomplish a specific purpose.	Ex 3. Construction Research project	
3.0 Integration	3.1 Connect relevant experiences and academic knowledge.	Ex 1. Self-assessment of own academic plan and goals to link research to career opportunities.	
	3.2 Make connections across disciplines.	Ex 2/3. Make a connection between top 5 strengths and how they can be used to choose electives and CLE courses.	Ex 1/2. ePortfolio prompt asking students why they chose the CLE’s and electives for their Plan of Study. Reflection on how their strengths can help in their courses.
	3.3 Reflect upon self-assessment as learner	Ex. 1. Complete final semester paper with reflection on self-learning. Ex.2 Spring semester will address overall learning experience.	Final papers will be posted on personal ePortfolio site.