

## **ACADEMICS TO PRACTICE (A2P): COLLABORATION BETWEEN INTERDISCIPLINARY ACADEMIC TEAMS AND INDUSTRY**

Richard Seseek, University of Utah  
Scott Collingwood, University of Utah  
Eric Wood, University of Utah

r.seseek@utah.edu

### **ABSTRACT**

Occupational Safety and Health (OSH) represents a broad discipline of safety and health professionals with differing, but complimentary backgrounds that work together to protect the safety and health of workers in occupational settings. A2P: Academics to Practice represents the didactic commitment to practical application and problem solving that is often missing in the typical academic setting. This is a summative write-up on a novel, capstone course, “Occupational Safety and Health Solutions”, aimed at providing practical problem solving experiences for project teams comprised of students from different academic backgrounds in the core disciplines of OSH. It is recognized that safety and health is not a “cut and dried” arena and there are many philosophies and approaches that will benefit from a diverse faculty with varied backgrounds. A major emphasis of the new course was on practical application of safety and health theories and intervention strategies. The importance of compliance with applicable safety and health laws and regulations, particularly those of the Occupational Safety and Health Administration (OSHA), was stressed. Students learned about the tradeoffs associated with various safety and health interventions and be exposed to return on investment (ROI). Future classes will be exposed to more business concepts, including: internal rate of return (IRR), and net present value (NPV) methods for comparing various potential workplace abatements and improvements. Instruction also included integration of ethics into safety and health decision making so that intangible, but important human values could be incorporated into decision making. Emphasis was also be placed on presenting the perception of safety and health as a “value added” function as opposed to a “cost,” particularly with respect to ergonomics, industrial hygiene, and productivity.

A substantial portion of the class involved on-site visits to local businesses to learn how they manage their safety and health responsibilities. Each student was required to participate on an interdisciplinary team to “solve” (or markedly improve) a safety and health problem at a local workplace. Many project topics were considered including development of OSHA required programs and training, guarding of machinery, and reducing exposures to toxic substances until the final ergonomic process improvement projects were decided upon. Student teams were carefully assigned to include participation from as broad a group as possible to reflect the cross-disciplinary nature utilized in many organizational structures.

## INTRODUCTION

### **Academics to Practice (A2P)**

A2P: academics to practice represents the didactic commitment to practical application and problem solving that R2P (research to practice) represents for research. Occupational Safety and Health (OSH) represents a broad discipline of safety and health professionals with differing, but complimentary backgrounds that work together to protect the safety and health of workers in occupational settings. OSH is an applied discipline and as such requires “hands on” activity to master. Hands on activities, workplace projects, and field site visits are consistently rated by graduates (and potential employers) as among the most beneficial aspects of an OSH education. Applying classroom knowledge to real world problems has many benefits. These benefits, in addition to valuable workplace experience, include helping to focus students on how to apply their OSH education. Prospective employers can “kick the tires” on potential hires (and vice versa). Simulating the “real world” in the classroom or laboratory can be difficult and there is no substitute for learning in the field and becoming familiar with the nuances of problem solving. Both students and participating companies enjoy a great deal of satisfaction solving real problems that simply cannot be matched by classroom projects.

### **Implementing Academics to Practice (A2P)**

A2P is already a big part of many classes offered through the Rocky Mountain Center for Occupational and Environmental Health (RMCOEH). Many classes involve problem-solving projects that take students off-site and into industry. However, these projects typically involve relatively small groups of homogenous students and therefore rarely involve the entire class or students with diverse academic backgrounds working together as team. Previous efforts have been largely informal, and it is the intent of the project authors to formalize these activities by incorporating them into the curriculum in a very concrete and organized manner. To this end, a new, capstone interdisciplinary course, “Occupational Safety and Health Solutions” was created to reinforce A2P concepts in the final semester of RMCOEH students.

### **Rocky Mountain Center for Occupational and Environmental Health**

The Rocky Mountain Center is one of only 16 regional NIOSH Education and Research Centers (ERCs). The RMCOEH is a multi-disciplinary center with diverse faculty. These backgrounds, while diverse, are complimentary. There is a strong teamwork focus and all of the elements necessary to implement a successful A2P program already exist. The multi-disciplinary faculty includes practitioners from Industrial Hygiene (IH), Occupational Medicine (OM), Occupational Health Nursing (OHN), and Ergonomics and Safety (E&S). Strong adjunct faculty and numerous guest lecturers, particularly in OHN, support the faculty.

The RMCOEH has 3 primary disciplines (E&S, IH, & OM) with 4 academic tracks. These academic tracks include: Ergonomics and Safety (E&S), Industrial Hygiene (IH)/Hazardous Substance Academic Training (HSAT), Occupational Medicine (OM), and Occupational Injury Prevention Research Training (OIPRT). Faculty *and* students from all 4 tracks were represented in the inaugural offering of this course. In fact, as planning for the course progressed in the

months before it's offering, it was met with such enthusiasm by the center director (Dr. Kurt Hegmann), that the decision was made to make it the capstone course for all students at the RMCOEH.

## **CREATION OF A NEW CAPSTONE COURSE**

### **Occupational Safety and Health Solutions Course**

#### **Funding**

An Interdisciplinary Teaching Grant (U of U) was applied for and awarded to help develop this new course. OSH Solutions has the support of RMCOEH faculty and administrators and local businesses. Interest in participating with this class from industry has been strong and projects for subsequent years are being arranged in advance.

#### **Faculty**

Core course faculty includes Eric Wood (OM), Scott Collingwood (IH & HSAT), and Richard Sesek (E&S). Other RMCOEH faculty also provided guest lecture support to this course. Guest lecturers from outside the RMCOEH included Norman Waitzman, Ph.D. lecturing on "Cost Justification of OSH Interventions" (Economics Department), Kristen Smith-Crowe, Ph.D. presenting "Behavioral Safety Performance" (College of Business), and Gary Kopps, MS with a presentation on "Selling Safety to Management" (Deere and Co., Corporate Safety Manager). Our industry partners and collaborators (tour and project hosts) act as "faculty in the field" by sharing their day-to-day safety and health responsibilities and their "problems" to the class. These hosts benefit from the "extra sets of eyes" brought to bear on their facilities. Often, solutions to simple safety and health concerns can be proposed and implemented during walk-through facility tours.

#### **Students**

It is the intention of the primary instructors to involve as many interested students from as many departments as possible in this class. The inaugural class included Occupational Medicine Residents, Industrial Hygiene students, Ergonomics and Safety students, Public Health (OIPRT) students, and students from the Mechanical Engineering department. Significant growth in class size and expansion to other departments is expected in subsequent years. For example, several psychology students studying human factors engineering have expressed an interest in participating in this course.

#### **Teaching Philosophy**

Prior to beginning the semester, the core faculty met several times to discuss the teaching philosophy for the Occupational Safety and Health Solutions (OSH Solutions) course and agreed on the following major teaching goals:

- Creation of the best possible learning environment (interactive, hands-on, and post-visit discussions).
- A focus on problem solving and implementation (A2P). The problem solving process should involve discussion of the pros and cons of various “solutions” and “debates” of the merits of each.
- An effort to teach the “why” not just the “how” of good safety practices. For example, explaining why the calibration of a particular piece of equipment, such as an air-sampling pump, is done in a particular order, not just the steps required in performing the operation. This provides students with the information to make more informed judgments in the future; such as if circumstances require deviation from a standard operating procedure or emergent conditions constrain alternatives.
- Liberal use of demonstrations and on-site activities to illustrate major points (in addition to images and video used in the classroom). To the extent possible, bringing safety and health equipment, particularly, personal protective equipment (PPE) and safety hardware such as lockout/tagout devices into the classroom.
- Maximize the use of “real world” experiences. The cornerstone of this class is to bring the occupational world into the classroom *and* the classroom into the occupational world. This includes guest lecturers from industry in addition to “war stories” shared by the faculty. Each of the faculty has extensive OSH experience outside the academic setting including industrial, government, and consultative roles.

A major goal of the faculty was to “personalize” the course as much as possible and to tailor the topics, when possible, to the interests and research of the participating students. By necessity, the lectures are structured to the demands of the current projects. Students are expected to have a solid background in safety and health; therefore, many of the lectures are summary overviews of major safety and health topics with emphasis on the overlap and common pathways among the OSH disciplines, particularly IH, OM, and E&S. Select students from backgrounds other than safety and health are encouraged to enroll and are subsequently provided with supplemental information to augment the summary reviews provided in class. Emphasis is on problem solving and case studies (both historical and current events). Often, the perspective of students outside of safety and health disciplines is very valuable since they bring minimal “baggage” or preconceived ideas about what safety and health is or should be. In addition to “thinking outside of the box”, we found the students emanating from the engineering disciplines brought a keen focus on production and quality to the multidisciplinary problem solving teams. This fostered solutions that not only had high efficacy from the OSH perspective, but also minimized impact or even positively effected production metrics (cycle times, productivity, quality etc.).

## **INDUSTRY PARTNERS**

### **Site Visits**

Industry partners and industrial site visits, provide this class with the opportunities for students to apply what they have learned while pursuing their graduate educations. The value of healthy and professional relationships with industrial partners cannot be overstated, and this value is introduced and cultivated in the classroom and field experiences. Students learn to respect the great trust that is afforded them as they travel “behind the scenes” and see much more than would be observed on a typical tour. Important safety and health concerns that may be

discovered must be quickly and tactfully presented to the facility hosts, usually through one or more of the faculty members. The handling of such concerns is critical and helps establish the trust that allows these on-site projects to achieve much more than the typical class project.

In addition to the class projects, the class also tours a wide spectrum of facilities that is intended to expose students to as many different safety and health arenas as possible. A typical tour schedule might include such facilities as a garage door manufacturer, a mountaineering products manufacturer, a jewelry manufacturer, a military base maintenance facility, a freight/shipping company, and a foundry. Class discussion is often directed at comparing the relative strengths and weaknesses of the various facility safety programs and safety cultures.

## **Projects**

Projects can range from assisting a garage door manufacturer with an analysis of loading dock ergonomics and the costs associated with manual materials handlings to improving the safety and ergonomics of an avalanche safety device assembly line at a mountaineering products company. Projects are discussed early in the semester and periodically reviewed to ensure that steady progress is being maintained. On-site projects provide mini-internship-like opportunities for the students. Companies enjoy the benefit of faculty oversight to ensure that project analyses are sound and that conclusions and recommendations are reasonable, feasible, and appropriate.

## **DISSEMINATION OF OCCUPATIONAL SAFETY AND HEALTH INFORMATION**

In order to bring the lessons learned from projects to a wider audience, the projects and materials developed in the OSH Solutions course will be published on the web and available in PDF format. All company and personal identifiers will be removed prior to posting and only those projects that do not contain proprietary information will be posted or distributed. Confidentiality of project findings is important and will be maintained. The “solutions” will be provided in summary format with pictures (if allowable) and/or illustrations and be presented in 1 or 2 pages, similar in size and style to OSHA “Fatal Facts” documents. These solution summaries will include both engineering controls and best practices. These efforts will contribute to the general body of knowledge in OSH. These materials will be made available free of charge. It is hoped that these “solution materials” will encourage further participation, not only with the OSH Solutions course, but with other courses and stimulate other A2P collaborations including funded research projects. The RMCOEH continues to investigate all forms of support (both financial and in-kind) for these efforts.

## **LESSONS LEARNED AND FUTURE PLANS**

The discussion-based interactive nature of the OSH Solutions course allowed for real-time feedback from students and participating facilities. This allowed several opportunities to mold the course to better meet the demands of the students, and address needs of the participating hosts and facilities. Feedback was directly solicited from participating students to craft the course for future offerings including a review discussion during the last week of class. The core faculty will now meet every fall to pre-plan the spring semester offering of the course. Tours of project facilities will be conducted sooner in the semester to allow more work on projects during

the semester and to give the faculty more time to arrange appropriate guest lecturers on topics relevant to the projects undertaken. Additional focus will be placed on relevant material specific to the demands of the selected projects in the current semester as opposed to a formal review of core OSH academics.

Summary lectures will be augmented with supplemental handouts, and directed independent review for those that have not been previously exposed to the materials being taught. More on-site project time and class-time (without lecture, but with faculty available as a resource) will be budgeted for teams to work on their projects both independently and in groups. Project progress updates will be made more formal to ensure that progress is maintained throughout the semester. More structure will be added to the pre- and post-site visit discussions to ensure that all students are fully participating in these important interactions.

More emphasis will be placed on the incorporation of economics, cost justification, and ethics into the curriculum (as well as more discussions of case studies in class). In addition, more discussion time will be devoted to the historical, social and legal underpinnings of OSH and the various motivations for pursuing quality OSH programs.

Early in the semester the class as a whole will focus on the solution of several “mini-problems” and the addition of short summary solutions to common problems and “white papers” (e.g., grinder reminders, safety glasses information sheets and the like) to add to the OSH Solutions database on the web. This will help “prime the pump” for semester projects. Students will also be required to make more presentations to the class and to project sponsors to help improve their communication skills and to help them gain experience in presenting their academic and technical knowledge across disciplines to promote OSH.

Feedback from students, faculty, and industry partners has been very positive and enthusiastic. The A2P philosophy will be incorporated into as much of the RMCOEH students’ educations as possible. Collaborations among faculty, departments, and outside entities have increased as a result of these activities. The A2P philosophy makes learning fun, memorable, and, most importantly, effective.

## **ACKNOWLEDGEMENTS**

The initiation of the Occupational Safety and Health Solutions Class and the genesis of the A2P teaching philosophy were supported by a University of Utah Interdisciplinary Teaching Grant. This work was also supported (in part) by the Rocky Mountain Center for Occupational and Environmental Health at the University of Utah. The Rocky Mountain Center, an Education and Research Center, is supported by Training Grant No. T42/OH 008414 from the Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health. The contents are solely the responsibility of the authors and do not necessarily represent the official views of the National Institute for Occupational Safety and Health.