Teaching Effective Problem Solving Skills to Radiation Protection Students

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Abstract

Problem solving skills are essential for all radiation protection personnel. Although some students have more natural problem solving skills than others, all students require practice to become comfortable using these skills.

At the University of Ontario Institute of Technology (UOIT), a unique one-semester course was developed as part of the core curriculum to teach students problem solving skills and elements of modelling and simulation. The underlying emphasis of the course was to allow students to develop their own problem solving strategies, both individually and in groups. Direction was provided on how to examine problems from different perspectives, and how to determine the proper root problem statement. A five-point problem solving strategy was presented as (1) Problem Definition, (2) Solution Generation, (3) Decision, (4) Implementation, and (5) Evaluation. Within the strategy, problem solving techniques were integrated from diverse areas such as: De Bono's Six Thinking Hats, Kepner-Tregoe Decision Analysis, Covey's Seven Habits of Highly Effective People, Reason's "Swiss Cheese" Theory of Complex Failure, and Howlett's Comon Failure Modes. As part of the evaluation step, students critically explore areas such as ethics and environmental responsibility.

In addition to exploring problem solving methods, students learn the usefulness of simulation methods, and how to model and simulate complex phenomena of relevance to radiation protection. Computational aspects of problem solving are explored using the commercially available MATLAB computer code.

A number of case studies are presented as both examples and problems to the students. Emphasis was placed on solutions to problems of interest to radiation protection, health physics and nuclear engineering. A group project, pertaining to an accident or event related to the nuclear industry is a course requirement. Students learn to utilize common time and project management tools such as flowcharting, Pareto analysis, Fishbone diagrams and Gantt charts.

It has been found that the tools learned in this course are used through all subsequent courses. In addition, early student and employer feedback suggests that the problem solving, modeling and simulation skills of the undergraduate students make them extremely valuable in the workplace.

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