

Student Perception of a Series of Activities in a Manufacturing Processes Course

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Getting students involved in experiential activities in a manufacturing processes course is important to meeting the learning objectives, however, with limited facilities and classroom time, some creativity is required. Here, a series of activities was conducted during the entire semester and students were asked to comment on the value of the activities. The results from this group of students appeared to show students found favorites and had unique and personal opinions on which activities gave them the best learning experience. Interestingly, some students cited traditional lectures and homework, and others selected field trips and independent investigations with in-class presentations as best activities for learning.

The objective of the Manufacturing Processes course is to provide engineering students with basic information on materials and processing necessary to change 'stock' material into a useful, value-added product. The knowledge of the vocabulary or terminology, basic process parameters and the unique characteristics associated with each process is required. The course learning objectives state that the student will be provided with the tools to qualitatively describe: 1) the workings of a variety of processes, 2) the relative advantages and disadvantages associated with the individual processes, and 3) the interrelationship of a single process to other process(es) in the fabrication of a complete assembly or product. Students taking this course are comprised of juniors and seniors with a major in industrial engineering (required), and in mechanical or biomedical engineering (elective).

A list of the activities completed in this manufacturing processes course included:

- a) "Attention to Detail" – writing and following directions for an everyday task,
- b) machine shop observation – same machining parameter for different materials in the turning and milling processes,
- c) video field trips – independent viewing of technical videos with brief written report,
- d) industrial field trips – traveling to manufacturing facility (e.g. foundry), observing in-person and writing a brief trip report,
- e) "quick-n-dirty" CNC machine activity – in-class activity to model a 5-axis CNC machine on simple component shapes with in-class reflection/ discussion,
- f) material selection activity- support choice of material and possible manufacturing processes of a component using CES material selection software,
- g) portable NDT kit – independent investigation with in-class presentations and reflection/discussion, and
- h) traditional lecture.

Some of these activities are well-proven and the “quick-n-dirty” CNC machine activity, the material selection activity, the portable NDT kit will be highlighted in paper.

Student perception of these activities can obviously ‘make-or-break’ its effectiveness. The results of the assessment survey will be shared. The questions included on the assessment survey are listed below and the insight gained from this group of students will be summarized in the paper. These six general assessment questions were posed to the students at the end of the semester and are as follows:

- 1) List those activities which you feel gave you the skills and abilities listed in the outcomes.
- 2) List those activities which you feel did not succeed in giving you the skills and abilities listed in the outcomes.
- 3) List the activities which you feel gave you the best learning experiences.
- 4) List the activities which you feel could be modified or added to improve your learning experience.
- 5) What qualities do you use when you say an ‘activity’ is a ‘good’ one?
- 6) What qualities do you use when you say an ‘activity’ is not an effective learning experience?