

**Educational Research Report**

**Industrial Experience Program Employer Survey  
MUSE 8/EC 2000 Results**

Presented to the MUSE Faculty

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Compiled by:

Shelia Barnett  
Assistant Professor of Industrial Engineering  
Director, Industrial Experience Program

and

Joan Burtner  
Assistant Professor of Industrial Engineering  
Member, Assessment Committee

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#### Introduction

Researchers at other engineering schools have provided data that university-sponsored work experiences provide a rich environment in which students can develop skills related to learning outcomes such as teamwork and communication. Wankat, Oreovicz and Delgass (1998, p.4) report that a 1994 alumni survey indicated that practical work experience, along with lab and design courses taken at the school, were very important sources for learning certain "soft skills". The survey instrument listed written and oral communication, ethics, teamwork, leadership, and meeting skills; however, other EC2000 a-k outcomes such as global and contemporary issues were not included in the survey. The Wankat, Oreovicz and Delgass results as well as those of Canale, Cates, and Duwart (2000) indicate that students' non-course activities such as co-ops and internships offer a very good opportunity for students to develop their soft skills. Here at Mercer, we have decided to use employer evaluations to investigate all eleven EC2000 a-k outcomes to gain an outsider's perspective on our curriculum.

Employee evaluations are an important part of the Mercer University School of Engineering Industrial Experience Program. Shelia Barnett, director of the Industrial Experience Program and Joan Burtner, member of the Assessment Committee, have obtained Institutional Review Board approval to conduct a survey to document the effect of co-op experiences on EC2000 outcomes. To facilitate this research, Shelia revised the

Employer's Evaluation form to include direct references to the MUSE 8. This revised form was first distributed to employers at the beginning of the Summer 2001 term. During October 2001, Joan collated the results from the surveys that had been collected to date. Forty-eight students participated in the program during the Summer 2001 term; thirty-nine employee evaluations have been returned to the Industrial Experience Program Office. This report describes select data from the employer survey as it relates to MUSE 8 outcomes.

### The Survey Instrument

The survey was reviewed and approved by Mercer's Institutional Review Board in spring 2001. The survey includes twenty-five questions related to students' work performance. Nineteen of the twenty-five questions use a Likert-type scale with the following values: Excellent-5 Very Good-4 Average-3 Below Average-2 Poor-1. The remaining survey questions allow non-Likert responses; the questions deal with students' strengths and weaknesses and future employment status. Copies of the employer survey are available in the Industrial Experience Program Office.

### Survey Results

We have developed two tables that summarize the results as they relate to the MUSE 8 outcomes. Table 1 includes rank-ordered evaluation data by outcome. Table 2 is a comparison of ratings by work experience level.

Table 1: Rank-ordered evaluation by outcome-Summer 2001

<i>Outcome</i>	<i>Description</i>	<i>Mean Score*</i>
5	Ability to function effectively on interdisciplinary teams.	4.42
6	Ability to communicate effectively in a variety of modes, i.e. written, oral and visual.	4.39
1	Ability to apply mathematics and science principles to the solution of engineering problems.	4.31
2	Ability to apply appropriate breadth and depth of skills in identification and analysis of engineering problems.	4.22
4	Ability to design and conduct experiments and analyze data.	4.19
3	Ability to apply appropriate breadth and depth of skills in engineering design and analysis of engineering problems.	4.17
7	Ability to relate the practice of engineering to global contemporary issues, to professional ethics, and the need for lifelong learning.	4.09
8	Ability to provide leadership and contribute to sustaining and improving the community.	4.05
Overall		4.23

\*Scale: Poor-1 Fair-2 Good-3 Very Good-4 Excellent-5

Table 2: Comparison of ratings by work experience level

OUTCOME	CO-OP YEAR			
	1	2	3	4
1	4.21	4.33	4.75	4.50
2	4.04	4.50	4.75	4.50
3	4.08	4.50	4.25	4.50
4	4.12	4.33	4.50	4.00
5	4.30	4.83	5.00	4.00
6	4.30	4.33	5.00	4.50
7	4.00	3.83	4.50	4.50
8	3.96	3.83	4.50	4.50

\*Poor-1 Fair-2 Good-3 Very Good-4 Excellent-5

Discussion

As seen in Table 1, outcomes 1, 5, and 6 received the highest rankings. It is perhaps not surprising that communication and teamwork are so highly rated by employers.

Anecdotal evidence from past conversations with employers has indicated that our students perform well in these areas. In light of previous survey results, it is somewhat surprising that the employers give such a high rating to our students' ability to apply math and science. As reported by Burtner (2001, March 26) our freshmen have exhibited low self-confidence in their math and science ability; freshman students enrolled in the Mercer University School of Engineering during AY 99-00 who took the Pittsburgh Freshman Engineering Attitudes Survey© rated themselves 3.1 (on a 1-5 scale) for the

math and science outcome. On the other hand, employers of students who had just completed their freshman year gave the work experience students a rating of 4.4 (also on a 1-5 scale).

Outcomes 2, 3, and 4 received slightly lower scores. However, the data show employers are generally satisfied with students' ability to solve problems and analyze data.

Outcomes 7 and 8 received the lowest average scores. These results are not unexpected, as employers typically do not evaluate engineering students on these attributes.

Additional information may be gleaned by looking at the employer evaluation based on the number of work rotations the work experience students have completed. For summer 2001, 27 of the surveys returned were for students enrolled in the program for the first time; the numbers for the second, third and fourth rotations were six, four, and two, respectively. Table 2 clearly indicates that satisfaction with student performance showed a positive correlation with the number of rotations completed. While these results are encouraging, this is the first time this data has been analyzed in this manner. Future research will indicate whether this is a lasting trend.

Regardless of relative rank, it is important to note that each outcome was rated greater than 4.0, on average, by employers. This is encouraging news. Data from this survey are especially important as they provide input from an external source that can be used to help complete the feedback loop as we continually assess the engineering curriculum.

## References

Burtner, J. (2001, March 26). Pittsburgh Freshman Engineering Attitudes Survey© EC 2000 Results. Unpublished report presented to the MUSE Faculty.

Canale, R., Cates, C., & Duwart, E. (2000). Co-op and ABET 2000: The added learning dimension. American Society for Engineering Education Annual Conference Proceedings, Session 1661.

Wankat, P. C., Oreovicz, F. S., & Delgass, W. N. (1998). Integrating soft criteria into the ChE curriculum. ASEE Annual Conference Proceedings, Session 2613.