

A Qualitative-cum-Quantitative Research on International Manager Development: Acquisition of Competence in Engineering and Management Tasks

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There is a problem with the existing management development program offerings in assuring proper quality with respect to the professional need fulfillment of managers. The assurance of program quality does not rely on critical processes of evaluation and review. This lack of a proper Effective Program Evaluation and Review Technique fails to meet the following needs of manager's development:

Need for managerial development and learning strategies for effectiveness
Need for corporate education for global competitiveness
Need for professional development, promotion and succession
Need for managers' lifelong learning
Need for program evaluation and review for effectiveness, and
Need for bridging theory and practice for effective decisions.

The data collection for evaluation was made by the use of following instruments. Evidence of the validity and reliability of the instruments was ascertained from published results.

- (1) Instrument Set-1 / Q-1. Knowledge, Skills, Attitude Instrument (Harvard Study)
- (2) Instrument Set-1 / Q-2. Hersey and Blanchard's Leadership Effectiveness and Attitude Description (LEAD)- Questionnaire
- (3) Instrument Set-1 / Q-3. Kolb Learning Styles Inventory (LSI)
- (4) Instrument Set-1 / Q-4. Demographic Profiles Inventory
- (5) Instrument Set-2 Part I: Instructor and Course Appraisal
- (6) Instrument Set-2 Part II: Instructor and Course Appraisal
- (7) Instrument Set 3: Composite Program Evaluation
- (8) Instrument Set 4: Faculty Interview Protocol
- (9) Instrument Set 5: Participant Interview Protocol

The research used repeated measurements of reaction, learning, behavior and results using the above instruments on managers coming from international populations, in pretest, posttest and three-month posttest. The research also used the same instruments on the comparison group as a pretest and evaluated the effect of the program intervention as a gain on international managers' knowledge, skills and attitude when compared with their comparison group.

The Population

The population of this study was ninety-eight international engineering managers and corporate specialists from different organizations who attended the tenth annual Purdue University Engineering/ Management program from April 24-April 30, 1995. These managers were either nominated by them or were nominated by their superiors to participate in the training program. This was the first time the program reached a participation level of ninety-eight managers and senior managers. The faculty of Prude University Graduate Schools of Business (Department of Executive Education) and Engineering (Continuing Engineering Education) selected these managers from a large pool of applicants who met the selection criteria and qualifications.

The Research Questions

This research examined management education from a quality assurance perspective, paying attention to measurable ends of such education. This evaluation study attempted to measure those changes that occurred in the knowledge skills and attitudes from before to after the program. Further research questions of the study were:

1. How well did the program experiences meet the 'needs' of the managers? Evidence used to answer this question was gathered using a follow up questionnaire.
2. What were the impacts of these experiences on attending managers and on their corporations?

The impact of the training on the managers and their organizations was analyzed. The impact was assessed using Kirkpatrick's (1987) four levels of evaluation of the training program for effectiveness. [1] and [2]

Analysis and Summary of Presentations

Using SPSS, the data were analyzed with respect to variables associated with participants' (1) key background information, (2) perceptions of managerial skills with regard to importance and competence, (3) leadership adaptability behavior to managerial decision making situations and (4) preferred learning styles.

Twenty-two background variables were summarized and their effects analyzed. Sixteen themes of programs consisting of sixteen courses were collapsed to four major themes of strategy, productivity, leadership and global competition. The managerial skills survey of importance and competence with forty-two items were combined to produce the above four major themes. Hersey and Blanchard's Leadership behaviors of the participants were scored and plotted in the relevant quadrants of Telling-Selling-Participating-Delegating. The distribution of the leadership profiles of participants fell primarily in the style quadrant of Selling and secondarily in the style quadrant of Participating. Kolb Learning Styles were also scored and their distributions were recorded in the four quadrants consisting of Diverging, Accommodating, Converging, and Assimilating. The primary learning style was found to be Converger and the secondary style to be Accommodator (Kolb, 1976, 1981). [3]

There were forty-two **Importance** related questions as well as forty-two **Competence** related questions in the Management Skills questionnaire. (Stevens, 1990) on Analysis of Variances (ANOVA) suggest that there is more reliability in having small number (in this case seven) of collapsed sub-scale skill items than large number of individual outcome level elemental items (Stevens, 1990) [4]. With this treatment, to give reliable results, and for ease of reporting results, the forty-two items were collapsed to seven sub-scales of major skills as reported in Table 1. The Purdue Management Development Program had sixteen courses designed and delivered in seven major skill areas. The skills analyzed were the seven sub-scales of the questionnaire. From a statistical standpoint, this method increases the likelihood of finding reliable results. From the theoretical standpoint, this method increases the likelihood of finding meaningful results.

Skills Group (Sub-scale)	Skill Items (#Questions)	Purdue Courses
Organizational Leadership	1-12 (Twelve Questions)	Three courses
Human Resource Management	13-19 (Seven Questions)	Two courses
Financial Management	20-22 (Three Questions)	One course
Decision Making	23-28 (Six Questions)	Three courses
Strategic Planning	29-33 (Five Questions)	Four courses
Negotiation and Conflict Resolution	34-40 (Seven Questions)	Two courses
Managerial Communication	41-42 (Two Questions)	One course

Table 1. Classification of Subscales of skills for analysis and number of courses offered

The Executive Development Associates (EDA) study has shown earlier that management development programs normally have four main areas of thrust, namely, *Strategy*, *Productivity*, *Leadership* and *Global Competition*. These following sixteen courses fall into four major areas.

Strategy: Negotiation and Dispute Resolution, Competitive Advantage, Change Management, Human Resource Management (Skills Sub-scales: Negotiation and Conflict Resolution, and Human Resource Management)

Productivity: Design for manufacturability, Human Factors and Ergonomics, Career Management, Decision Analysis (Skills Sub-scale: Strategic Planning)

Leadership: Managerial Communication, Designing Organizations for Teams, The Creative Process, Presentational Speaking (Skills Sub-scales: Organizational Leadership, and Managerial Communication)

Global Competition: Global Technology Management, Managing Investment Decisions, Marketing for Technical Managers, Accounting and Finance (Skills Sub-scales: Decision Making, and Financial Management)

Statistical analyses combined the important findings from the four important modules of the questionnaire--background, important skills needed to develop/ competence displayed

or possessed, management style predominantly present, and the learning style employed to manage.

Reported below are the results of the analyses for the statistically significant differences at the .05 α -level. Some remarks about how the analyses were conducted have been appended for ease and readability. Whenever a mean has been reported, the standard deviation has been given in parentheses after it (e.g., mean of 54.6 (1.235)). Likewise, when t or F statistics are reported, the degrees-of-freedom are reported in parentheses immediately after the type of statistic (e.g., t (34) = 2.12). The Standard Error of the Difference (SEdiff) is given for all t-tests and the mean-square-error (MSe) is given for all ANOVA's. All one-way ANOVA's used Student-Newman-Kuhl post-hoc analyses (SNK) to test for statistically significant differences between groups. All post-hoc analyses are reported at the .05 significance level also. Results have been summarized for hypotheses tested.

Rank order of Ten skills by mean scores of (a) Importance and (b) Competence

(a) PARTICIPANTS PRE-SURVEY - RANK ORDER OF IMPORTANCE (N=78)

IMPPREX	DESCRIPTION	MEAN	SD
IMPRE6	Building trust with peers, superiors	4.50	.55
IMPRE25	Establishing priorities, setting goals	4.46	.66
IMPRE31	Writing: expressing ideas correctly	4.42	.79
IMPRE41	Understanding clientele (customer) needs	4.42	.88
IMPRE12	Budgeting my work time	4.39	.69
IMPRE2	Having Flexibility: Varying behavior	4.37	.77
IMPRE42	Making oral presentations: impact	4.36	.99
IMPRE8	Taking initiative to assume responsibility	4.31	.61
IMPRE1	Directing program/project implementation	4.29	1.08
IMPRE19	Delegating, coaching, providing follow-up	4.27	1.00

(b) PARTICIPANTS PRE-SURVEY - RANK ORDER OF COMPETENCE (N=78)

COMPREX	DESCRIPTION	MEAN	SD
COMPRE28	Dealing with ambiguity	3.96	.67
COMPRE6	Building trust with peers, superiors	3.91	.89
COMPRE8	Taking initiative to assume responsibility	3.77	.92
COMPRE23	Using computer and information systems	3.74	.84
COMPRE41	Writing: expressing ideas clearly, concisely	3.72	.86
COMPRE2	Having flexibility: varying behavior	3.68	.91
COMPRE5	Demonstrating commitment beyond area	3.62	.87
COMPRE31	Understanding clientele (customer) needs	3.57	.85
COMPRE27	Conducting problem analysis	3.50	.80
COMPRE25	Establishing priorities, setting goals	3.50	.72

(c) DISCREPANCY RANK ORDER BY LARGEST DIFFERENCE BETWEEN IMPORTANCE-COMPETENCE (N=78)

DIFFPREX	DESCRIPTION	MEAN	SD
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DIFFPRE16	Subordinate Career Development	1.25	.68
DIFFPRE12	Budgeting time	1.19	1.14
DIFFPRE42	Oral presentations: Impact	1.05	1.14
DIFFPRE19	Delegating, coaching..	1.00	.81
DIFFPRE15	Motivating personnel	.97	.99
DIFFPRE25	Establishing priorities	.96	.89
DIFFPRE4	Using team building skills	.96	.80
DIFFPRE3	Communicating Enthusiasm	.94	.85
DIFFPRE34	Using political acumen	.87	1.09
DIFFPRE31	Understanding consumer	.86	.84

Summary of Quantitative Analysis: From a quality assurance perspective the study attempted to measure those changes that occurred in the knowledge, skills and behaviors of the participants, from before to after the program, in four levels of program effect e.g., reaction, learning, behavior and results.

Responses were gathered using qualitative interviews. Evidence was gathered using Learning Skills Inventory. Behavior was gathered using Leadership Effectiveness and Adaptability Description Questionnaire. Results were gathered using Managerial Skills Questionnaire of Importance and Competence over pretest, posttest and a three-month posttest on the job.

Forty-two management skills criteria were collapsed to identify seven main leadership skills for reliable evidence on the hypotheses tested: **Leadership/ Organization, Human Resource Management, Financial Management, Decision-Making, Strategic Planning, Negotiation and Conflict Resolution, and Managerial Communication.** Important findings are summarized below.

No significant differences were found in the Importance of each leadership skills:

(a) by the type of company's business (b) by the number of years of employment with the current employer, (c) by the number of years in the industry, and (d) by the type of degrees held by the manager (BS, MS, MBA).

Significant Differences were found in the Importance of each leadership skills:

(a) by a broad range of titles, (b) by the size of company, and (c) by the number of years in current position.

No significant differences were found in the Competence of each leadership skills:

(a) by the type of company's business (b) by the size of company, (c) by the number of years in current position, (d) by the type of degrees held by the manager (BS, MS, MBA), and (e) by the number of years in the industry.

Significant Differences were found in the Competence of each leadership skills:

(a) by a broad range of titles and (b) by the number of years of employment with the current employer. [5]

QUALITATIVE PROGRAM EVALUATION

Following are the questions and summary of responses to the questions regarding the effectiveness of the program. Written answers were given by the participants in place of interview as the program administrators felt that interviews may consume too much of the participants' time.

1. What are one or two of the important purposes of the Engineering/ Management Program?

Responses from eighteen participants reported that sharing concerns and ideas was important. Five of the respondents stated that just the interactions were important. Developing new skills was named twice. Developing confidence and developing leadership were each mentioned once.

2. In your experience, what are some of the most powerful ways to stimulate leadership in your subordinates?

Respondents stated that one way to stimulate leadership in subordinates was to give subordinates responsibilities. Teaching, challenging and coaching were each suggested three times as ways of stimulating leadership. Setting examples and using motivation were mentioned twice.

3. What are one or two contributions will you make in your position after the PU E/M Program?

Six respondents to this question were concerned with contribution to team development and empowerment. Two respondents emphasized that they would try to improve communications and group dynamics. Two respondents thought that program taught them creativity and change principles. Two responses were concerned with motivation of employees, leadership and management process.

4. E/MP uses the following learning activities for professional development: formal classes, cases, readings and assignments, discussion groups, OD/Sensitivity Training exercises, and informal small group activities.

a. What activities did have most desirable learning impact?

Almost all the respondents unequivocally stated that case studies and small discussion groups provided the most desirable learning effect.

b. Why do you think they were the most appropriate effective?

Five respondents said that they shared concerns, interactions and viewpoints. Four said they learned from real life situations of case studies and group activities. Three said that by doing, the level of retention was increased and because they were tangible. The remaining ones did not answer.

c. How will you benefit from these activities?

Four respondents said they learned new techniques. Three said that program broadened perspectives. Three said they saw new group and team involvement from program.

5. How did the program operate to fulfill its objectives?

Most of the respondents said that the program fulfilled the objectives. Two said that the program gave variety of methods and options in dealing with situations. Two reported that the program was intensive with high learning expectations.

6. How is the program linked to the overall leadership development for your company?

Three said that the program was not linked to corporate strategy. Three said that the program exposed the department heads first to change and implement competitive advantage. Two said that their companies have been sending participants because the program was good.

7. a. Describe your role in your company implementing some of the goals of P.U. E/M Program.

Three said that they would lead in implementing within their jurisdiction. Two said they would assume responsibility. Two said they would use change methods learned. One said he/she would continue team building efforts.

b. Please give an example of ways your goals have changed recently to adjust to changes occurring in Engineering and Management.

Four respondents said that their company's goals have changed to "empowered teams" and customer service. Two said that such programs enhanced effectiveness and enabled to value programs.

8. a. What do you think are the strengths of the program?

Most respondents said that interaction was the main strength. Other strengths were varieties in classes, topics, ideas, critical thinking, faculty, and convenient and open format.

b. What criteria did you use just now, as you identified the strengths?

Criteria were personal learning, opinion, observation, environment, participant backgrounds and rewards of the program.

c. What do you judge are the limitations of the program?

Most respondents suggested that limitations were time, and not enough course offerings, concerted focus--no reflection in action, frequency of programming, and lack of integration in lectures.

d. What changes would reduce or eliminate the limitations?

Some respondents said that the program should be practical, with increased teaching time for breadth, precise learning objectives, increased class size, should stretch over longer periods and be more frequent.

e. What changes could turn them to strengths?

Two said more classes and instructors must be added. Some suggested split pattern of class with work-learn-work. Others did not know.

9. Please give an example of "informal" learning situations in which P.U. E/MP participants like you acquired new leadership skills.

Almost unanimously the response was cases and group discussions.

10. What are your goals for implementing the program benefits as they relate to your leadership?

Most respondents stated that they would take leadership roles with more responsibilities and use the knowledge gained. One said develop team communications.

11. Briefly, how did the program address to your Skills, Decision Styles, Learning Styles, and Background Profile for effectiveness?

Each of the seven responses reporting ways the program addressed their management skills were unique. Of the six positive responses, four were strongly positive. One response was somewhat neutral and one response was negative.

12. There is little written about middle managers in industries.

a. What leadership skills are most important for them?

Most of the responses emphasized importance of communications/ human relations, shared vision, and coaching/motivation. Others were focused on managerial versatility, directing change and problem solving and understanding the customer.

Communication skills/ Human Relation skills.

b. In what ways are their roles changing?

Most reported broadening of responsibilities, yet moving from boss to coach. One said they are getting more technical and one said they are reduced or eliminated as the organizations flatten. But most agree the roles have been tougher.

13. Are there further comments you would like to make about the P.U. E/M Program?

Some suggested that weekly class time be extended and Saturday class eliminated. Some suggested the program must have new offerings and needed change.

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