EMPLOYEES' PERCEPTIONS ON TEACHING, LEARNING AND USE OF QUANTITATIVE METHODS: A SURVEY REPORT

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This paper reports the findings of a survey conducted in 1996 among graduates of the City University of Hong Kong on their learning experience of Quantitative Methods (QM) in the University and the use of QM in their present jobs. On the average, these respondents have worked for more than three years in various industries which include Banking/financial Institutes, Trading, Utilities, Government, Transportation, Education, Accounting, Manufacturing, Construction, and Insurance. Item factor analyses were used to combine the responses to the Likert-type statements in the questionnaires into scales for interpretation and logistic regression was used to study the association of the scales and the respondents' perception towards a good QM course/subject.

The survey shows that, in terms of QM training, employees are most concerned with the acquisition, development and enhancement of competence in quantitative analysis which includes problem-solving skills, analytic skills and data interpretation skills. The results of the survey could provide useful information on the design of programs and courses for the continuous statistical development for employees in different industries.

THE SURVEY

The Department of Management Sciences (MS), City University of Hong Kong (CityU) offers more than fifty modules in quantitative analysis that serve about 17 courses in the University. Committed to providing quality education for professional practice that anticipates and responds to the changing needs of Hong Kong Community, the MS department is eager to obtain up to date information on the effectiveness and quality of its teaching. A survey, through the support of the Teaching Enhancement Fund, of opinions of our graduates towards our QA modules and course was conducted in 1996.

Objectives

The main objectives of the survey are: (1) to collect graduates' perceptions of teaching quality and learning experience while studying quantitative analysis modules in CityU; (2) to gather graduates' views on the relevance of course curriculum and syllabus content to the current needs of the Hong Kong business world; and (3) to find out the extent of use of Quantitative Techniques by our graduates.

Coverage

The survey aims to study the course experience of graduates from a course offered by the MS department and modules experience of graduates from several courses serviced

by the MS department. All graduates of BA(Hons) in Quantitative Analysis for Business (BAQAB) in 1989 to 1994 were included in the sampling frame for the course experience survey. Graduates from four courses, BA(Hons) in Accounting (BAAC) in 1990 to 1994, BA(Hons) in Business Studies (BABS) in 1992 to 1994, BCs(Hons) in Finance (BCsFIN) in 1993 and 1994 and BA(Hons) in Public and Social Administration (BAPSA) in 1990, 1992 and 1994 were included in the module experience survey. Students graduated after 1994 were excluded from the survey as the time since graduation to the period of survey was less than one year. The total number of graduates included in the sample was 2,095.

Questionnaires

The questionnaire used in the survey was based on the latest version of the Course Experience Questionnaire (CEQ) developed by Ramsden and his colleagues over a number of years (Ramsden et al 1989, Ainley and Long 1994, Wilson et al 1996). The CEQ has passed through several stages of development and trials and it is now widely used in the Australian higher education as a standard national instrument to measure graduates' perceptions of teaching quality.

Focus Groups

Although the Course Experience Questionnaire was available for use at the time of development of the questionnaire for the survey, in order to develop a more relevant questionnaire appropriate for the local context and that could specifically achieve the objectives of the survey, five focus group discussions with graduates of different courses were held to identify the major issues and relevant hypotheses that were considered important by the graduates to quality teaching and student learning.

Based on the findings from the focus groups and the CEQ, two questionnaires were developed. One is for the graduates of BAQAB. The other is for the graduates of other courses, who had taken at least one module on Quantitative Analysis offered by the MS department. Each questionnaire consists of six parts. Part I contains statements related to course curriculum and teaching methods for the BAQAB graduates or Syllabuses and teaching methods of the Quantitative Analysis modules for the other graduates. Part II asks graduates to nominate the important characteristic of good lecturer/tutor. Part III is related to learning process. Part IV aims to find out the frequency of use of quantitative techniques by the graduates in their work. Part V is an open ended question for

respondents to write down any comments they would like to make. The last part collect the personal particulars of respondents.

Fieldwork

A pilot test was conducted in November 1995, with reminders sent out one week later, to evaluate the validity of the questionnaires, the response rate and to find out the method preferred by respondents for returning the completed questionnaire.

The main fieldwork started in the middle of December 1995 in the form of a postal survey. Reminders were sent to all graduates in the sample one week later. The whole process ended in January 1996. A total of 635 completed questionnaires were returned.

The 635 questionnaires were manually checked for incompleteness and inconsistency. In order to ensure that the data file created was free from error, a computer program was developed for checking inconsistent and illegitimate entries. The data file went through a computer checking procedure on a 100 percent basis. Errors found were manually corrected.

Out of 2095 questionnaires sent out to the graduates, a total of 635 questionnaires were completed and returned. There were 68 undelivered questionnaires due to wrong or incomplete addresses. The effective response rate is 31.3%. For postal survey of this kind, such a response rate is rather satisfactory.

While there are other interesting findings of the survey reported in (Lo et al 1997), this paper concentrates on the opinions of our BAQAB graduates who have been employees in industry for more than one year on their teaching and learning experience while studying in CityU and their use of quantitative analysis in their work.

MAJOR FINDINGS FROM GRADUATES OF BAQAB

Course Curriculum and Teaching Methods

The first part of the questionnaire consists of 25 statements on a variety of issues related to the course curriculum and teaching methods of the course BAQAB. Respondents were asked to indicate their views about each of the statement by circling an integer between 1 and 5, with label “strongly disagree” for the integer 1 and “strongly agree” for the integer 5. The five most supported statements are:

The course improved my analytic skills.
Team/Group Teaching is useful to students.
The course developed my problem-solving skills.
The course was not difficult for me.
I learnt how to use the statistical package after attending the statistical modules

All the mean scores of the five statements are close to 4 meaning that the average response to these five statements is some what closer to the "agreeing" category. Hence, It is clear that in general graduates found the program BAQAB useful in improving their analytic skill, and in developing problem-solving skills. They had learnt how to use statistical packages in the program and they agreed quite strongly that team/group teaching is useful.

Combining Statements into Scales

According to Ainley and Long (1994) and Wilson et al (1996), the statements in the Course Experience Questionnaire (CEQ), based on which the present questionnaire was developed, can be grouped into five scales. As some of the statements in the CEQ have been revised, some deleted and yet new statements have been added in the present survey, we believe that a specifically developed set of scales would be more suitable to the undergraduate teaching and learning environment in Hong Kong. As such, we conducted an item factor analysis on the whole sample of 166 BAQAB graduates. Statistical package SPSS for Windows Version 6.0 was used to extract principal components and orthogonal rotation (varimax) was used to transform the components to make them more interpretable. Four scales were thus obtained and they went through a series of reliability and validity analyses for the confirmation of their appropriateness of use for the population.

The four scales comprise of the following statements:

Professional Skills Scale:

The quantitative analysis techniques were useful for my job.
The course developed my problem-solving skills
The course improved my analytic skills
I learnt how to use the statistical package after attending the statistical modules

Good Teaching Scale:

The teaching staff put a lot of time to give me helpful feedback on my work.
I was generally given enough time to understand the things I had to learn.
The teaching staff made a real effort to understand difficulties I might be having with my work.

The lecturers were extremely good at explaining things.
Handouts and assignments were well designed, and assisted learning.
The course equipped me with good business sense.

Communication Skills Scale:

The course helped me develop my ability to work as a team member with good interpersonal skill.
The course improved my written and oral presentation skills.

Appropriate Workload Scale:

The course was too difficult for me.
The work-load was too heavy.

Reliability and Validity.

Cronbach's alpha was used to check the internal consistency of the scale. As all the four scales have alpha value greater than 0.5, the internal consistency reliabilities of the four scales are satisfactory.

The validity of the scales may be determined by the degree of association between the scale scores and the degree of satisfaction with the course. It is expected that graduates who perceive favourably the teaching, workload and professional skills would be more satisfied with the course. Thus statement 25 (*Overall, I am satisfied with the quality of the course*) could be used as a measure of overall satisfaction with the course and the correlation coefficients of this statement with the scale scores used as measures of scale validity. These coefficients indicate that there is a positive relation between overall satisfaction and perceptions of satisfactory teaching, achievement of professional skills etc. The strongest correlation are from Professional Skills and Good Teaching scales while the weakest is from the Appropriate Workload scale. These levels of association support the validity of the four scales.

Similar results are found using logistic regression with overall satisfaction as dependent variable and the four scale scores as explanatory variables. Three scales are found to be significant in explaining the variation in the variable "Satisfaction" which is recoded as 0 if statement 25 equals 1, 2, or 3 and 1 if statement 25 equals 4 or 5. The p-values of the three significant factors are: Professional Skills Scale (Wald's statistic = 22.9, p=0.0000), Good Teaching Scale (Wald's statistic = 12.7, p=0.0004) and Appropriate Workload Scale (Wald's statistic = 4.1, p=0.0442). It can be concluded that

attainment of professional skills and use of knowledge learnt from the course for the jobs are the most important factors affecting graduates' overall satisfaction with the course.

Applications of Quantitative Techniques

The frequencies of use of different quantitative techniques by the graduates are examined in order to find out which techniques are most often used in their work.

It is observed that Descriptive Statistical Methods, Elementary Data Analysis and Forecasting Methods are the most popular statistical techniques. Decision Analysis, Inventory Control and Mathematical Programming are the popular Operational Research techniques.

As for the more advanced and complicated quantitative techniques, it is understandable that as these techniques are not for daily or routine use and the problems to which these techniques are applied are usually more complicated and more involved, and are related to specialized sections of an organization, they are not as popular as the basic statistical techniques and decision analysis. In fact, it is quite encouraging to observe, on the average, close to half of the graduates have used at least one of these advanced techniques in their work. The types of job that are found to have higher percentages of graduates using "Multivariate Analysis" are Research and Development, Teaching/Training and Statistical/Data Analysis. On the other hand, Production/Operations Management, Statistical/Data Analysis and Research and Development are the types of job that require higher percentage of graduates to use "Simulation".

Current Users of Quantitative Techniques

If all the quantitative techniques are taken together, a measure of the extent of use of these 14 techniques could be defined as follows: A score of 1 mark is given to occasional use, 2 marks to moderate use and 3 marks for frequent use of any one technique. A graduate is defined as a current user of quantitative techniques if he/she has scored more than 5 marks. Overall speaking, about three-quarters of our graduates are current users of quantitative techniques. This figure seems to increase moderately in the last two to three years probably due to wider recognition of the use of quantitative techniques for improving performance and efficiency of an organization. Transportation, Education and Manufacturing are the types of organizations in which over 80% of our

graduates are working as current users of quantitative techniques. The types of jobs with which over 80% of our graduates are current users of quantitative techniques are Statistical/Data Analysis, Teaching/Training, Production/Operations Management and Research & Development.

CONCLUSION

Similar results were found from graduates of other courses serviced by the MS department. The survey shows that, in terms of QM training, employees are most concerned with the acquisition, development and enhancement of competence in quantitative analysis which includes problem-solving skill, analytic skills and data interpretation skills. The most commonly used quantitative techniques by graduates in their work include “Elementary Data Analysis”, “Descriptive Statistical Methods”, “Forecasting Methods” and “Decision Analysis”. Transportation, Banking/Finance, Education and Manufacturing are the types of organizations where quantitative techniques are used frequently. The results of this survey could provide useful information on the design of programs and courses for the continuous statistical development for employees in different industries.

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