# 17. STUDY PROGRAM FOR NETWORK TECHNOLOGY AND ITS EVALUATION

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**ABSTRACT**

*This paper introduces the study program for network technology in the NEC in-house education system, specifically a new study program and its evaluation for technical managers, supervisors and senior engineers, etc., in NEC.*

The original version of this chapter was revised: The copyright line was incorrect. This has been corrected. The Erratum to this chapter is available at DOI: 10.1007/978-0-387-35393-7_22
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## 1. Introduction

□NEC is ideally positioned to be the leader in multi media, having all three key multimedia technology; semiconductors, computers and communications, and the technological expertise enabling us to provide total multimedia solutions. NEC University ( subsidiary corporation of NEC) was established as a total education system (management & technology) for NEC group in 1997.

One of the objectives of ITE (NEC University Institute Technology Education) is to transfer in-house technologies, to spread the most advanced technologies throughout NEC Group employees and to maintain and promote the superiority of the company's technologies. The other is to develop creative human resources.

The results of a recent opinion survey in our company indicate that about 30% of the engineers who responded to the survey, have strong expectations for continuing technological education so that they will be able to grasp the most advanced technology. Therefore, the necessity for an in-house education is strongly endorsed by employees. Especially, the results indicates that many engineers have strong expectations for the education in network integration technology.

## 2. Objectives and Structures of Study Programs

The needs of technological education have broadly been divided into three categories. One of these is for younger engineers to study, basically and systematically, the technology in the major business fields of the company. Another need is for employees to become leaders in grasping the most advanced technologies in specific fields. Another is to improve rapidly the practical skills directly concerned with the job.

To cope with the above mentioned needs, the ITE has three study program, ITSP (Integrated Technology Study Programs), PTSP(Principle Technology Study Programs), and RTSP(Relevant Technology Study Program).

## 3. Study program for network technology

1. Study program in PTSP

Themes related with network technology in PTSP are information network, electronic commerce and control engineering for network. The purpose of these study programs, is to deepen student's knowledge of the most advanced network technology, to extend their specialties and also to develop the key people of network technology.

2. Study program in ITSP

ITSP have computer network lectures (computer technology course),network lectures & most advanced specific technology lecture(software technology

course),and networking lecture (system technology course)related with network technology. These study programs aimed at saving the knowledge of the basic technology and trends of network technology.

3. Study program in RTSP

The objective of the RTSP is to make rapid improvement in practical knowledge and capability that are directly concerned with the student's job. Courses in RTSP are selected to meet common needs throughout the company. Study programs in network technology have not been available in RTSP.

We planned, the "basic network technology course" as a new network technology study program in RTSP.

## 4. Practical experience of a study program for basic network technology

There was not a systematic study program with regard to network integration technology and a study program intended for old NEC Group employees, in ITSP, PTSP and RTSP. Therefore, we planned and commenced the systematic study program for basic network technology in RTSP. Moreover, this program intended for research and development managers or supervisors to develop the network integrator and to cultivate the knowledge of network technology. The field of the lecture is the basic field of network technology. The contents of this course are shown as following Table □ . Students take 4 lectures every Wednesday from 9:00 a.m. to 4:30 p.m. at the classroom of ITE , which is located at NEC tamagawa plant.

In each lecture, the stuffs of ITE print out the electronic files which were sent by lecturers, using E-mail and distribute the materials of lecture to every students previously. The curriculum contains wide network technology area from basic theory to network business trends as shown in Fig.1.

For example, communication protocol contains the basic theory of TCP/IP and route control technology etc. Moreover, Network Business Trends contain also the strategies of the charge system of network and so on.

The length of student's service is shown in Fig.2. The average length of service in this course is 14.4 years and longer than that (4 □8 years) of students in ITSP ,PTSP and RTSP.

We evaluated the effect of this course as follows. This course was evaluated by three methods as shown in Table 2.

1. Method 1 was the questionnaire at the end of this course. This method showed total impression for this study program.
2. Method 2 was the questionnaire at the time after each lecture. This method showed each impression for each lecture.
3. Method 3 was the evaluation by examination.

This study program was evaluated by the above three methods. Fig.3 shows the evaluated results using method 1. It was found that almost all students under stood

these lectures from Fig.3. Fig.4 shows the evaluated results using method 2. There were a few lectures which almost all students could not under stand from Fig.4. For example, lectures 14 and 22 were not understood. One reason for these results was that these lectures contained numerical formulas and matrix. But, it was found that almost all students could understand other many lectures with the exception of a few lectures. Fig.5 shows the results of examination using method 3. Examination was performed at the end of the course with condition in which students can refer to the text of each lecture. The evaluated scores of examinations spread as shown in Fig. 5.

A few students could not reach the full level of comprehension according to the results of examination. Those evaluated point of a few students were 30□ 40 point as shown in Fig.5. One reason for this results was that these students were not present at the lectures and could not prepare for the examination to be busy with their work. But, the evaluated scores showed that almost all students understood the lectures, because the average value for this examination was 71.9.

Thus, Method 1 was effective for macroscopic evaluation for this course. And Method 2 was effective for detailed evaluation of the each lecture.

Method 3 was effective for actual level check of comprehension.

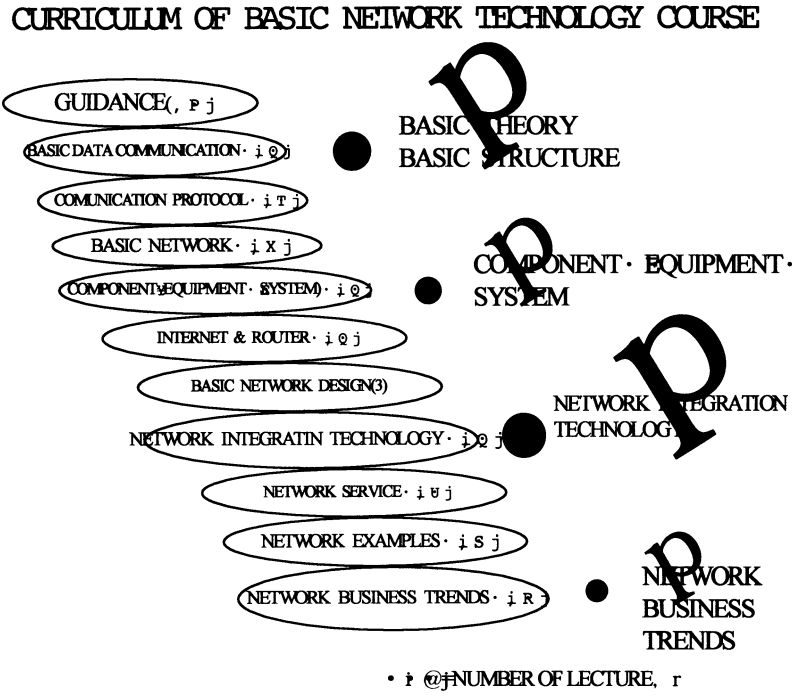
It was very effective for the total evaluation that this course was evaluated by three methods.

From these evaluations, this basic network technology course contributed to develop network integrators and to save the knowledge of network technology for managers of NEC Group employees.

Table 1 BASIC NETWORK TECHNOLOGY COURSE

| NAME OF COURSE | BASIC NETWORK TECHNOLOGY COURSE |
|---|---|
| PERIOD | 3 MONTHS (39 LECTURES + 1 TEST) |
| STUDY | 1 DAY/WEEK 4 LECTURES/DAY<br>90 MINUTES/1 LECTURE |
| NUMBER OF STUDENTS | 76 |

Fig. 1.


CURRICULUM OF BASIC NETWORK TECHNOLOGY COURSE
GUIDANCE(, P j
BASIC DATA COMMUNICATION· j Q j
COMUNICATION PROTOCOL· j T j
BASIC NETWORK· j X j
COMPONENT▲EQUIPMENT· SYSTEM)· j Q j
INTERNET & ROUTER· j Q j
BASIC NETWORK DESIGN(3)
NETWORK INTEGRATIN TECHNOLOGY· j Q j
NETWORK SERVICE· j U j
NETWORK EXAMPLES· j S j
NETWORK BUSINESS TRENDS· j R j
BASIC THEORY
BASIC STRUCTURE
COMPONENT· EQUIPMENT·
SYSTEM
NETWORK INTEGRATION
TECHNOLOGY
NETWORK
BUSINESS
TRENDS
• j @j=NUMBER OF LECTURE, r

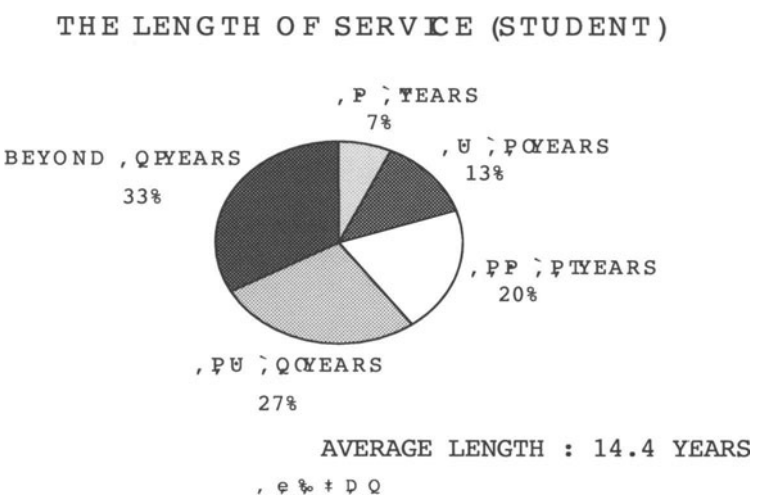



Table 2 The Evaluation Method For This Course

| | |
|---|---|
| METHOD 1 | QUESTIONNAIRE AT THE END OF THE COURSE |
| METHOD 2 | QUESTIONNAIRE AT THE TIME AFTER EACH LECTURE |
| METHOD 3 | COMPREHENSION CHECK BY EXAMINATION AT THE END OF THE COURSE |

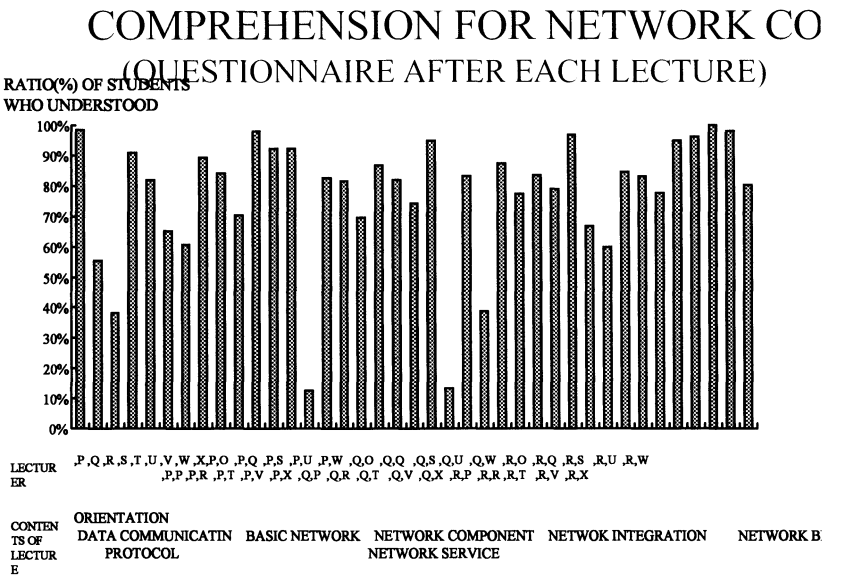
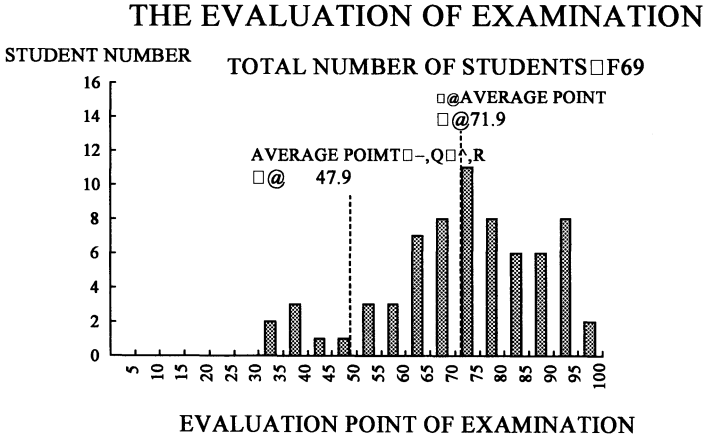
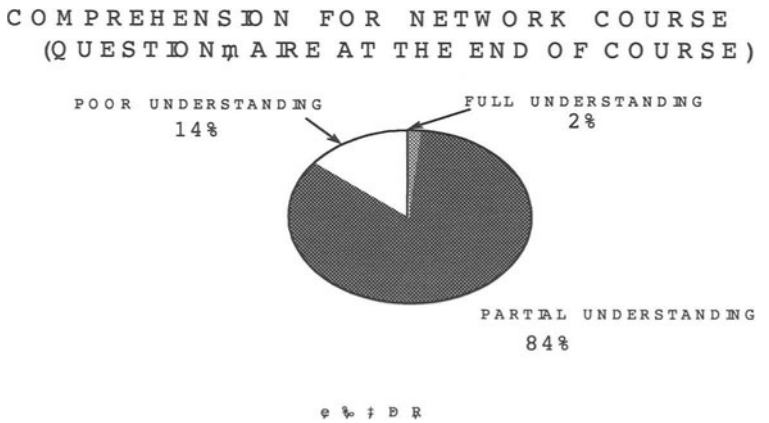

COMPREHENSION FOR NETWORK CO
(QUESTIONNAIRE AFTER EACH LECTURE)
RATIO(%) OF STUDENTS WHO UNDERSTOOD
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
LECTURER
,P ,Q ,R ,S ,T ,U ,V ,W ,X,P,O ,P,Q ,P,S ,P,U ,P,W ,Q,O ,Q,Q ,Q,S ,Q,U ,Q,W ,R,O ,R,Q ,R,S ,R,U ,R,W
,P,P ,P,R ,P,T ,P,V ,P,X ,Q,P ,Q,R ,Q,T ,Q,V ,Q,X ,R,P ,R,R ,R,T ,R,V ,R,X
CONTENTS OF LECTURE
ORIENTATION
DATA COMMUNICATIN PROTOCOL
BASIC NETWORK
NETWORK COMPONENT NETWORK SERVICE
NETWOK INTEGRATION
NETWORK B

Figure 3.


THE EVALUATION OF EXAMINATION
STUDENT NUMBER
TOTAL NUMBER OF STUDENTS□F69
□@AVERAGE POINT
□@71.9
AVERAGE POIMT□–,Q□^,R
□@ 47.9
16
14
12
10
8
6
4
2
0
5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
EVALUATION POINT OF EXAMINATION




## 5. Conclusion

We planned and commenced the new network technology course to develop the net work integrator and to cultivate the knowledge of network technology for old NEC group employees. We evaluated this study program by three evaluation me hods.

It was very effective for the evaluation of the study program that these three evaluation methods were applied for this course. This network technology course was evaluated by macroscopic questionnaire (Method 1), partial questionnaire (Method 2) and examination (Method 3).

From these three evaluation methods, we estimated that almost, all students were able to understand the contents of the lectures. It was very important that the evaluation of the study program should be done by the above three methods.

We developed the new network technology course intended for old NEC Group employees and evaluated this course by three methods. As a result, it was found that this study program was very effective for developing the network integrator and cultivating the knowledge of network technology for managers of NEC Group employees.