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Toyota's In-House Education and Professional Development for Engineers

R. ITO
General Manager, Technical Administration Division, Toyota Motor Corporation, 1-Toyota-Cho, Aichi 471 Japan

A description is given of the ways in which the Toyota Motor Corporation educates and trains its employees through the course of their careers. The author is not an educator but an engineer; the programs introduced in the presentation are not only the latest ones, but also those in which the author has participated during his own career.

OUTLINE OF TOYOTA'S HUMAN RESOURCES DEVELOPMENT

TOYOTA'S human resource management is based on the following contentions: first, employees are the company's greatest asset; second, proper human resource management allows the company to grow and prosper, which creates job security; finally, careful human resource management provides a stable and positive relationship between employees and management.

Toyota has a guiding view of the qualities its employees need to exhibit: first, they must be 'thinking employees'. As an example of positive ways to foster this characteristic, Toyota maintains a quality circle program and bottom-up management style to empower employees, and stimulate them to think carefully about their jobs. The second characteristic required of Toyota's employees is the '3C Spirit'. The '3 Cs' are *creativity*, *challenge*, and *courage*. The final characteristic Toyota employees must exhibit is a substantial level of on-site experience. The desire for on-site experience leads to a high priority for on-the-job training (OJT). Thus, managers systematically give higher levels of work to their subordinates to help develop their capability. In turn, the managers actively learn how to effectively manage their subordinates.

The Human Resources Development Program seeks to foster motivation among employees, and to use that motivation to develop the employee's capabilities. There are several mechanisms to accomplish this: the fundamental mechanism is OJT. In addition there are three mechanisms to ensure ongoing human resource development at all levels.

The first mechanism is compulsory collective education, where collective means group education. There are compulsory requirements for new as well as current employees. Current employees are categorized as middle-rank employees, newly appointed managers, assistant managers, managers, assistant general managers, and general managers.

The second mechanism consists of voluntary and assigned education requirements. These requirements are subdivided into those which take place in-house and those which occur outside. Examples of in-house voluntary and assigned education include engineering education, quality control (QC) seminars, correspondence courses, foreign language courses, and overall management studies using the case method. Examples of outside voluntary and assigned education involve participation and presentation of papers in professional engineering, academic, and industrial societies such as the Japanese Society of Automotive Engineers (JSAE), the Japanese Society of Mechanical Engineers (JSME), the US Society of Automotive Engineers (SAE), and the Japanese Automobile Manufacturers' Association (JAMA).

The final mechanism consists of enlightenment activities at the general corporate level. These are goals the company must achieve as a unit. Examples of previous corporation enlightenment activities include collective corporate efforts to receive the Deming Award (1960s), efforts to meet US emissions regulations (1970s) and the 'Management Capability Enhancement Program' (late 1970s to early 1980s). The 'Innovative Activities Toward the 21st Century Program' is the major enlightenment activity at the present and for the foreseeable future. Each of these demanding programs requires the active involvement of all employees.

Each job function, whether of a shop employee or a technical or administrative employee has its own unique structure of OJT, including compulsory, assigned, and voluntary education steps.

COMPULSORY COLLECTIVE EDUCATION AND TRAINING

New Employees

Education and training for new employees includes five months of collective education prior to job assignment, introductory education at an engineering division, introductory and development education in a specific department, on-site training at a specific section and education after a new job assignment in relevant subjects.

The initial five month training has the following aims: transition in attitude from student to adult citizen, gaining a basic knowledge of the company, and developing the ability to join the work-force immediately after the job assignment. To these ends, students receive collective education about the knowledge and spirit one exhibits as a Toyota employee ('Toyota Man') and a corporate citizen. Included is training at plants on the factory floor, training at a section to observe a specific job and its working environment, and also sales training.

Introductory education at the engineering division involves collective education and text-based learning. One is expected to learn about the rules of the engineering division including design rules, engineering report preparation methods, computer processing, engineering standards, and cost and weight control. In addition, other aspects of the job such as confidentiality, budget control, safety, hygiene, and various additional topics are covered.

Employees are not considered 'real engineers' until they are in their second year and have received compulsory training on an assigned subject: first, a subject is selected; then a study is undertaken to determine and solve problems associated with the job; study findings are identified; and finally, a presentation is given at a meeting to the department personnel involved.

Individual engineering departments hold education programs for specific technologies. The courses are offered for employees with experience ranging from new employees to middle-rank engineers, who typically have six years of experience.

Middle-rank employees

For middle-rank employees, the top priority is learning specific technologies. They participate in various in-house and external education and training activities, in addition to on-the-job training. The current system includes a specific course for Team and Group Leaders, a 'Step-Up Seminar' (SUS), and Leadership Training. For qualified middle-rank employees about to receive an assistant manager promotion, the aims are to enhance duty-performance capability, and develop the ability to assist superiors and lead juniors. The key is learning how to identify and solve problems. These employees receive overnight intensive training, and personal learning on how to identify and solve problems in their own workplace. They must submit a report and give an oral presentation on this subject.

Newly appointed managers

Newly appointed managers receive education with the following key points: assistant managers are expected to study basic management; section managers study analysis and innovation of working environments in each section; assistant general managers must study finance even if they are primarily engineers; and the general manager must study management expertise and communication with top management.

VOLUNTARY EDUCATION AND ASSIGNED EDUCATION

Voluntary education, as well as assigned education, can include in-house and external activities. External activities involve participation in domestic or overseas academic societies (subscription to the journals and participation in presentations at meetings), seminar participation, and industrial association participation. Some in-house education courses are held by the Human Resources Development Department. These include engineering education courses, courses on the Toyota production system, correspondence courses, seminars on administration, and management seminars. Other in-house courses are offered by the Overseas Personnel Department (foreign languages), and courses held by individual divisions. These include QC and reliability courses, courses on patents, and others.

In addition, there is the option of participating in the Toyota Engineering Society, an in-house group of engineers, office staff, and technicians. This society publishes in-house journals, gives in-house presentation meetings, offers new vehicle ride and drive demonstrations, and provides involvement in other activities.

ENLIGHTENMENT ACTIVITIES AT CORPORATE LEVEL

The enlightenment activities involve an entire division or the entire corporation and have significant influence on individual engineers. These activities included qualifying for the Deming Award in the 1960s, exhaust emission control to meet the US Muskie Clean Air Act in the 1970s, Management Capability Enhancement Programs in the late 1970s to early 1980s, and the current 'Innovative Activities Toward the 21st Century' program.

The attempt to receive the Deming Award was motivated by the desire to make a top quality product. It is important to notice that the goal was, not so much to win the award, as to institute concepts of quality control that would result in a high quality product. The immediate or short-term

goal of winning the award was, therefore, merely a consequence of the actions leading to the implementation of quality practices that would yield long-term benefits to the corporation. This corporate activity was started in the 1960s when the term 'Made in Japan' was seen as a symbol of a poor quality item. The company began by striving for good quality. The first step was to implement statistical quality control (SQC), and the final step was to achieve total quality control (TQC). The outcome of this long-term program was a consistently high-quality product, and the implementation of a scientific, modern style of management, with obvious long-term benefits for the corporation.

The exhaust emission control effort in the 1970s is another example of a program with an immediate goal, implemented in such a way as to achieve overall long-term benefits. In this case, the goal was, not only at the engineering division level, but also at the overall corporate level, to meet new US emission control regulations. This effort was seen as a high hurdle, as the reductions would be difficult to attain given the level of control technology that was practical at the time. In addition to meeting the standards, other important outcomes of the enlightenment activity included a new management style beyond the conventional framework, and a new confidence within the corporation and among its engineers that severe engineering challenges could be met. The momentum generated by this confidence resulted in the continuing development of new high quality products.

Another example of a corporate enlightenment activity was the Management Capability Enhancement Program, instituted in the late 1970s and early 1980s. The immediate goal was to be able to quickly implement management techniques to meet new requirements. An example involves developing management ability to effectively optimize balance among production activities, quality assurance activities, and emission control technologies, while facing increasing complexity and challenges in other areas. The long-term goal was to enhance self-perception and undertake self-implementation of necessary management measures, rather than relying solely on management methodologies imported from the US and Europe. An important result of this program was the realization that technological capability and management capability are both vital to a high level of management competence. They are the 'wheels of the vehicle'. Because these capabilities are important at all levels of management, this program has been extended from the corporate level through the division level, and even to the department level.

The final example of corporate enlightenment activities is the current 'Innovative Activities Towards the 21st Century' program. One important characteristic of this program is that it involves all corporate entities. While one might expect the production engineering and design engineering division to consider innovations of the future, one may be surprised to learn that the office and administration divisions are also active participants in considering innovations in their activities. This emphasizes the philosophy that the corporation can only improve in a meaningful way when every division, every department, and every employee focuses on the ways that each can contribute to the improvement in output.

SUMMARY

In common with other Japanese companies, Toyota has developed a comprehensive program for the professional development of its engineers. Figure 1 illustrates the number of types of training available for both shop and technical/administrative personnel and indicates the comprehensiveness of the in-house program. The development process is carefully and systematically managed. Although some use is made of external organizations and programs, most of the education and training is based on Toyota's in-house staff.

Ryozo Ito was born in 1937 in Nagoya, Japan. He graduated from the University of Tokyo and joined Toyota Motor Corporation in April 1959. He specialized in engine engineering including design, research and development of gasoline, diesel, gas turbine and Wankel engines. He is currently involved in US regulations on exhaust emission and fuel economy. He is General Manager of the Technical Administration Division of Toyota.

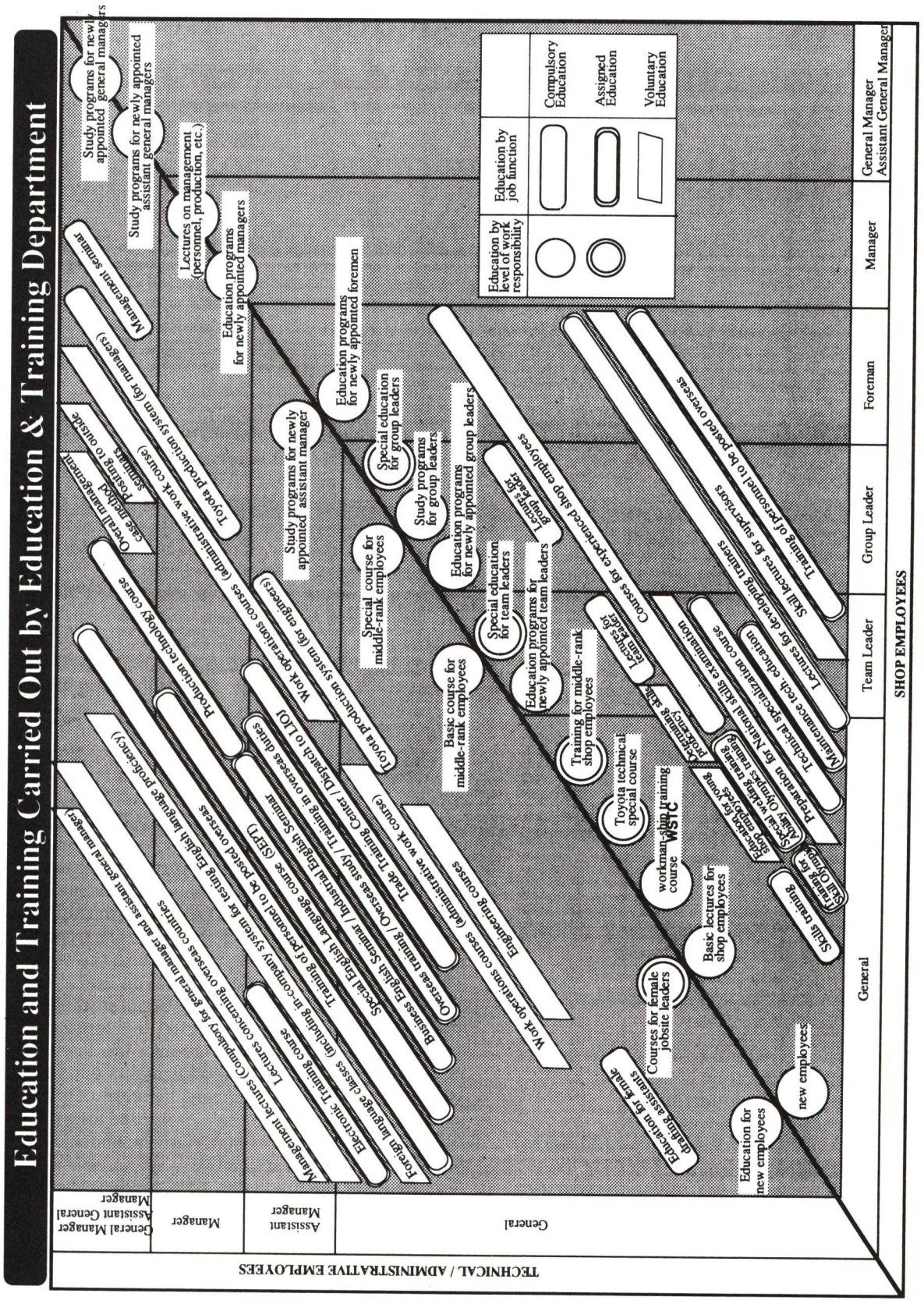

Fig. 1. Types of education and training carried out in Toyota.