METHODS OF VOCATIONAL TRAINING FOR OLDER WORKERS IN THE FRENCH NATIONAL RAILWAYS.

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WHEN THE FRENCH NATIONAL RAILWAY CONVERTED FROM STEAM TO AN ELECTRIC AND DIESEL-ELECTRIC TRACTION SYSTEM, IT WAS NECESSARY TO RETRAIN OLDER (OVER 40) SKILLED WORKERS -- DRIVERS, LOCOMOTIVE MAINTENANCE MEN AND SUPERVISORS OF WORKSHOPS AND DEPOTS. THE INTELLECTUAL AND EMOTIONAL DIFFICULTIES OF OLDER PERSONS IN RETRAINING WERE TAKEN INTO CONSIDERATION IN PLANNING THE RETRAINING. THE PROGRAM COVERS 11 WEEKS -- THREE WEEKS OF STUDY OF DIRECT AND ALTERNATING CURRENT, FIVE WEEKS ON THE CONTROL INSTRUMENTS, DRIVING AND RUNNING REPAIRS, AND REGULATIONS GOVERNING ELECTRIC TRACTION, AND THREE WEEKS OF DRIVING. TO INCREASE THE CONFIDENCE OF TRAINEES, DRIVING AND REPAIR MANUALS HAVE BEEN DRAWN UP, YOUNGER AND OLDER WORKERS ARE RETRAINED TOGETHER, INSTRUCTORS ARE CAREFULLY SELECTED AND WELL TRAINED, AND FELLOW-WORKERS WHO HAVE ALREADY EXPERIENCED TRAINING ARE CALLED BACK TO ACT AS MONITORS DURING THE DRIVING TRAINING. THE PROGRAM HAS PROVED VERY EFFECTIVE IN THAT THE NUMBER OF BREAKDOWNS DUE TO IGNORANCE ON THE PART OF RETRAINED DRIVERS IS VERY SMALL AND THE NUMBER OF DRIVING LICENSES FOR DIESEL AND DIESEL-ELECTRIC LOCOMOTIVES REFUSED TO EX-STEAMDRIVERS WAS NEGligible. THIS PAPER WAS PREPARED FOR THE INTERNATIONAL MANAGEMENT SEMINAR ON JOB-REDESIGN AND OCCUPATIONAL TRAINING FOR OLDER WORKERS IN LONDON, 1964, AND LATER PRESENTED TO THE NATIONAL CONFERENCE ON MANPOWER TRAINING AND THE OLDER WORKER, HELD IN WASHINGTON, JANUARY 17-19, 1966. (FT)
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INTRODUCTION

For the past ten years, the Société Nationale des Chemins de Fer Fransais has been confronted with difficult problems in connection with the training of older workers.

In the past ten years, the Equipment and Traction Directorate of the Société Nationale des Chemins de Fer Français has been faced with serious problems of training older workers (over 40). These problems have arisen as a result of the change-over from steam to electric and diesel-electric traction, in connection with the resettlement in the French railways of staff who had worked on Algerian railways before independence, and finally from the necessity of converting administrative and technical staff into teachers and instructors for the vocational training centres essential to the existence and smooth functioning of an organization employing 120,000 workers under conditions of rapid and continuous technical progress.

If certain conditions are fulfilled, there are no particular difficulties.

Experience acquired during this period shows that the training of older workers does not cause any real difficulties if it is carried out within an organization with well established pedagogic principles, if the teaching staff (both instructors and assistants) is sufficient, if the entire hierarchy (functional and productive) recognizes the importance of training and participates directly in it, and if everything is done to reduce the feeling of insecurity experienced by an older worker leaving a familiar job and undergoing training in order to take up a new one.

It should be stressed that the conditions listed above are precisely those which any undertaking which wishes to prosper in the future must fulfill, since the
adaptation to the technological changes imposed by progress and the promotion of the well-being of its entire staff are absolutely essential.

By way of example, let us examine the retraining of drivers.

Under the general heading of training I include all or some of the following activities: initiation, apprenticeship or preparation, adaptation or training, advanced training, maintenance courses and retraining; to illustrate the way in which the S.N.C.F. conducts the training of older workers, we shall see how the retraining of "steam" drivers as "electric" drivers was effected in one of the six regions of the French National Railways.

This example is of particular interest in that training must deal not only with the movements connected with the job but also with the mental processes and characteristic attitudes of the job; the employees concerned had the general educational level of skilled workers.

The principles and methods connected with such training are present in all training activities for older operational workers.

In fact we never dissociate the two elements "man-work", and the senior staff of the establishments directly responsible for production have received a sufficiently advanced training in psychology and teaching methods to enable them to analyze jobs and improve them and to study the behaviour of the staff and train them.

They are thus capable, in co-operation with the firm's doctor, of analyzing the difficulties of the older worker and of solving the problem of his retraining or progressive adjustment, taking into account the psychological considerations and physiological requirements of his job.

RETRAINING OF DRIVERS

The electrification of the Eastern Region made it necessary to retrain older drivers.

The gradual disappearance of "steam" traction in favor of electric and diesel-electric necessitated measures to retrain drivers which were started in 1947 throughout the Societe Nationale des Chemins de Fer Francais.

The electrification of the Eastern Region took place very rapidly: 915 km. of line were electrified between 1st July, 1954, and 29th September, 1957. The number of electric locomotives increased from 0 to 190 over the same period.

From September 1955 to March 1962, this region had to retrain 1,530 drivers of whom about 50 percent were in the 40 to 50 age-group, and since it was neither easy nor desirable to get rid of established drivers for whom there was...
no more work in steam traction, the contents and implementation of the retraining programme were designed to make it assimilable even to those in the highest age-group.

It was considered that, by making a special study of this operation, which would be repeated in more or less the same form throughout the S.N.C.F. as a whole, it would be possible to draw general conclusions with regard to the training of older workers.

This retraining is part of the normal training of a driver but has certain special features.

The normal preparation of a driver at the beginning of his career no matter what the method of traction, has three essential features:

(a) study of the regulations, the "Highway Code" of the Railways;

(b) initiation into driving proper;

(c) apprenticeship in running repairs in case of break-down.

The regulations differ little from one method of traction to another, and the retraining of a steam-driver as an electric driver is mainly concerned with the driving aspect (b) and the running repairs apprenticeship (c) which become difficult matters in view of the fact that:

Steam engines were actually driven by a crew - the driver and his stoker - and produced the power necessary for their operation, whereas the power for driving electric trains is supplied direct in the form of current in modern engines, which are driven by a single employee.

The disappearance of the conception of team-work connected with the "steam" mentality, which was the result of a time-honoured tradition that had left a deep impression on the workers involved, was felt very strongly by the old hands who were transferred to this new form of traction; moreover, electricity was an unknown world to them; this unknown and the fact that breakdowns are more difficult to detect, more sudden and more numerous, and could stop a train completely, created a new feeling of anxiety among the drivers to be retrained.

Electricity, breakdowns of electric engines are a source of anxiety to the older drivers who are to be retrained.

In their retraining, drivers are required to study the law of electricity, the technology of complex engines, the application of a process of decisions during driving based on a completely new type of information and by means of unknown instruments, and the acquisition of new behaviour and habits, governed by the supervision of instruments, and not, as it has previously been, a participation in the very life of the steam engine itself.
Teaching methods for training older workers should take account of the increased importance of the difficulties of an adult with limited education.

In defining teaching methods for the retraining of older workers we should first state the two main types of difficulties, which are intellectual and emotional.

**Intellectual**

The older a worker with an ordinary elementary education gets, the more difficult it is for him to learn in the four stages: perception, comprehension, retention, and assimilation - owing to his lack of intellectual education.

It is as well to point out the following fact which is the result of experience:

-Retraining in the S.N.C.F. was not confined to the drivers and locomotive maintenance men; it was of course extended to the senior supervisory staff of the electrified workshops and depots.

Practically, however, there was no problem involved in the retraining of the latter, such as there was with the operational staff. Between these two categories of employees there lies the gulf of academic culture and education, which prevent the psychological functions from aging and provide the person concerned with techniques of mental organization which enable him to adapt himself to fresh situations.

The workers on the other hand, were not sufficiently trained during their youth in observation, analysis and synthesis. Intellectually they are unfitted for acquiring fresh knowledge or changing their habits of mind or character; this gives rise to the first difficulty.

**Second difficulty**

While the adult worker has acquired a rich experience of life, it is vague and subconscious; his limited means of expression make him tongue-tied; he does not find it easy to grasp the essential of what he has learned or of what he ought to learn; he knows things, but more often thinks he knows them, and it is easy for his instructors to gain a false impression of what he has done in the past and concerning his ability to learn.

**Third difficulty**

The adult worker is not usually a diligent reader and the instruction given is often based on texts drawn up in the language of those who are teaching him, rather than in his own, with the result that the information necessary for the success of the training is not well understood. This gives rise to semantic and communication problems.
Fourth difficulty

The adult only learns well what he feels to be necessary to him. But while he is keen to understand the "Why?" of the matter, he does not clearly see the basic needs, while the notion of causality is vague. The result is that the older the worker the more difficult it is to arouse a keenness to learn about the indispensable basic theory.

Emotional

The adult undergoing training comes to "school" with all his ready formed habits and with his personal and family worries, which increase as he gets older. He finds himself in unfamiliar surroundings. He is afraid of losing face before the younger workers who are undergoing training with him and has a feeling of dependence on his instructors which does not engender confidence.

He projects into the reality of the present the image of what he remembers of his school-days and has a real aversion for courses; in his mind, the instructor is associated with his schoolmaster; he tends to adopt the childish and passive attitude of "the pupil towards the teacher", which facilitates neither communication nor participation.

He is troubled and hampered by the unknown element of the training course and by fear of the instructor's opinion of him.

Lastly, the adult trainee vaguely feels that, so far as he is concerned, training will involve a change in his habits; unconsciously, therefore, he adopts a defensive attitude.

The difficulties mentioned above, which are common to all adults, are experienced much more intensely by older workers, particularly when they have to give up the jobs which have been familiar to them for the past 20 years, and in which they were successful; this is precisely the case of drivers changing over from one type of traction to another.

WORKING OUT A SYSTEM OF TEACHING METHODS FOR THE VOCATIONAL TRAINING OF OLDER WORKERS

The teaching methods for training older workers consist of a combination of the teaching principles applicable to adolescents and those applicable to adults.

That being the case, how were the difficulties mentioned above tackled by the S.N.C.F.?

First of all by applying and adapting the pedagogical principles laid down by Professor Carrard of Switzerland on the basis of the Cartesian method, which are used for the vocational training of adolescents:
(a) taking an interest in the apprentice as an individual; which implies knowing something of the psychology and deep-seated needs of those to be trained;

(b) giving him confidence and awakening and maintaining his desire to learn and his pleasure in the work, which necessitates taking great care in receiving him at the start of training, explaining what is the aim to be achieved, supervising apprenticeship and working conditions, bestowing compliments rather than criticism and rendering success almost certain.

This implies:

- only teaching one thing at a time;
- proceeding from the simple to the complicated, producing the remedies for any difficulties likely to be encountered;
- keeping the effort demanded in proportion to the apprentice's capability, limiting the duration of instructional periods, allowing the necessary time for assimilation, increasing the means of checking up, beginning with concrete personal experience and practice and proceeding to the abstract and the theory which justifies it, while continually summing up the knowledge already acquired.

The first step, therefore, towards the retraining of these drivers was to get to know the older worker to be trained, so as to make a maximum use of all didactical methods based on the above principles in order to give him confidence.

In 1952, the American T.W.I. (Training Within Industry) method which was known in the S.N.C.F. under the title P.P.C. (Perfectionnement pratique des cadres) was used to supplement the 'Carrard' teaching principles; it drew attention to the differences in reasons for learning between adults and adolescents; it gave us a technique for analyzing the tasks to be taught on the basis of the idea of stages (carefully choosing "What has to be done"), key points ("how to do it well") and showed us the importance of follow-up, of drawing up training programmes on the basis of requirements and of ensuring that all senior staff took a real interest in training, on the assumption that the staff of any undertaking should be constantly improving their knowledge and that any leader should be both the instructor and the educator of his subordinates.

On the basis of these guiding principles, a retraining programme was established, the efficacy of which is demonstrated by the fact that the number of breakdowns due to ignorance on the part of retrained drivers is very small and that the number of driving licences for diesel and electric-diesel locomotives refused to ex-steamdrivers was negligible.
THE RE-TRAINING PROGRAMME

The retraining programme is a very gradual one. A very simplified training in electricity is on a strictly practical basis and is designed particularly to enable signals on the different parts and motors of traction engines to be interpreted for purposes of driving and running repairs.

The retraining programme is a very gradual one and covers 11 weeks.

It consists of Part A - lasting 3 weeks:
Two weeks of study of simple practical notions of electricity - direct current, one week study of alternating current.

Part B lasting 5 weeks:
One week study of the control instruments of modern locomotives, three weeks study of the driving and running repairs of 2 typical locomotives, known as "basic engines", one week study of the special regulations governing electric traction.

A driving course lasting 3 weeks...

In order to provide in a period of three weeks (Part A) an effective theoretical knowledge to workers of whom 50 per cent were in a higher age group and had no knowledge of electricity, a very strict selection had to be made of the notions generally dealt with in the elementary text books. Teaching of theoretical conceptions was reduced to a minimum so as to devote to each of them the time required to accustom the future driver to make use of them without error. There was no question of conducting a conventional electricity course; it was necessary to select the conceptions which were strictly necessary to an understanding of the operations carried out by the driver during driving and running repairs.

All these operations are carried out on the basis of signals which the driver receives through watching the exterior of various parts of the engine. That being so, technological ideas regarding the internal construction and internal phenomena are of little importance for the person who is driving. The most essential thing is the driver's direct relations with the equipment through his senses. So long as the external signs are normal, the driver does not have to interfere.

On the other hand, when an unexpected external signal tells him that there is something wrong internally, it becomes necessary for him to intervene. But when the mechanism is no longer functioning normally, it is not an exact knowledge of its normal method of functioning which can help the driver but rather a special study of each anomaly, of the means at his disposal for remedying it, and of how to use them.

It is therefore clear that it is advantageous when training older persons, to give very little attention to normal running and to deal with it only in order
to provide a better explanation of abnormal running, which is a cause of anxiety for the driver, and to devote the majority of retraining time to the identification of abnormalities and a study of the means of reducing his anxiety.

The following are therefore thoroughly taught:

- the notions of current intensity and voltage;
- the interpretation of the readings of volt-meters and ammeters incorporated into the circuits generally, and particularly those on the dash-boards of machines running normally and abnormally.

The internal construction of the engines and the normal phenomena which occur within them are dealt with briefly and given purely as an indication.

The external signals to be checked are not studied alone and independently of the reflexes which will be necessary to the driver during his work (appreciation of the situation, deduction to be made, decisions to be taken, etc.).

Consequently, a lesson or series of lessons on a given subject contain a combination of: the rapid study of a phenomenon, the signals observed in normal and abnormal running, and the rules of procedure resulting from them.

The elements to be remembered at the end of each lesson are listed under the heading "What must be remembered".

The rules of procedure under the heading "What must be done".

The basic aims of older drivers: to carry out the new type of operations successfully; certainty of success releases the tensions which hamper him at the start.

Thus, from the beginning, this highly analytical teaching is directed towards what the driver really needs to know and the action he must take, while at the same time developing his reflexes. All abstract notions are tied up with their practical application with the result that efforts of understanding, errors of interpretation and the nervous tension of the learner driver are reduced.

On the basis of the theoretical knowledge assimilated experimentally and concretely during Part A, Part B gives a simplified idea of driving methods, the inspection of and running repairs to an engine by means of a driving school locomotive incorporating all the features of a real one and everything which directly concerns the driver: controls, instruments, safety devices, auxiliary instruments and the circuits connecting them. All the instruments of the driving school engine operate normally, they can be adjusted to show breakdowns but they are designed in such a way that the student finds them easy to study and to regulate. The driving school engine is more simple than a normal engine. Whenever he wishes, the instructor can cause all the abnormal
indices to appear and the trainee is then required to carry out the operation which had been taught him in accordance with the signal shown; sometimes he is even required to carry out a check on his own mental processes by repeating aloud the operations he is about to perform; his words are recorded on a tape-recorder and he can subsequently check on the correctness of his actions since he is manipulating the various controls himself; his willingness to learn is thus stimulated by the feeling that he is teaching himself.

During Part B, a logical study of driving operations is carried out in the class-room, on the black board, on diagrams and simplified models (including the movements, observation, reflection and decisions) and the technological notions explaining them are also taught (mental reflexes).

Back at the driving school engine we return to the concrete aspect closely connected with actual driving by studying the signals which the instruments may give and the operations which the driver must carry out; i.e. having defined and explained the elementary operations in the class-room, we proceed to put them into action on the driving school engine and thus put practice into effect.

Once these elementary operations have been studied one by one, they are regrouped at the end of Part B in order to constitute series of operations (preparation of the engine, starting off, driving, stopping, break-down while running, break-down before starting, etc.).

It then remains to adapt the trainee to real driving on basic engines under the direction of a monitor for a period of three weeks.

The driver undergoing retraining is by this time fully "in the picture"; he experiences under the supervision of the monitor difficult situations which are caused more or less artificially.

An attempt is made to associate these with others he has experienced in the past, for it should not be forgotten that, while the young adult finds it easy to accept abstract reasoning, the older trainee prefers to depend on his experience.

Finally, it should be noted that drivers are not awarded marks or placed in an order of merit during the course.

ASSISTANCE GIVEN TO DRIVERS

The importance of drivers' manuals; driving and repair manuals.

The essential aim of retraining is to teach the operations necessary to driving and carrying out running repairs of engines with the best chances of success. In order to increase the confidence of drivers who will have to handle various
types of engine, driving and repair manuals for each type have been drawn up in accordance with a standard plan and a very carefully worked out identical method of presentation.

It is one of the aims of retraining to make the use of these manuals almost a reflex action.

Fear of break-downs on the line haunts the future driver, particularly as lengthy experience on steam engines has familiarized him with break-downs incidental to that type of traction; it is easy to imagine how much he depends on having the break-down manual always present on his dashboard. The manual tells him how to begin looking for the cause of break-down and leads him automatically to discover the circuit or instrument which has gone wrong, tells him the action to take and, in a word, gives him confidence.

THE TRAINING OF INSTRUCTORS FOR THE RE-TRAINING OF DRIVERS

Retraining older and young workers together is advisable.

It might be asked whether young and older drivers should be retrained together. Experience has shown that this is the better method to follow, providing that competent instructors with a thorough understanding of the underlying motives of groups of adults undergoing training and of the psychology of the "over forties" are available and that they know how to make use of the gift of more rapid assimilation by young people, who will be the first to be questioned during the courses and the first to imitate the demonstrations made during the practical exercises. At the same time they should make use of the older trainees' qualities, their past experience, level-headedness, willingness, enthusiasm, and devotion to the job, which increases with age.

Retraining depends on the quality of the instructors and monitors.

The above remark merely confirms what everybody knows: the value of methods of training older workers depends on those who do the training; hence the necessity of making a careful selection of the instructors who will conduct the training in the class-rooms and on the driving school engine (Parts A and B) and those who will supervise during the course of actual driving.

Instructors: these are selected from among the best assistant heads of depot who have taken a course of training for chief instructors (T.W.I.). The following fact, proved by experience is too frequently ignored:

The true worth and efficacy of the method is revealed at the level of the training of chief instructors (i.e., those who conduct the five initiation sessions of one of the three T.W.I. Programmes for foremen and supervisory staff). During his two week's training in the art of teaching, the future chief instructor, while studying the four well-known pedagogical principles, "putting the
class at ease", "presenting the operation", "let the trainee try to do it himself", and "repeat until known" which he has to teach to others, acquires a practical experience of how to conduct discussion groups, sensitises himself to group reactions, learns to read aloud, talk, question, listen and sum up the thought of others, and to treat each one in accordance with his personality in order to facilitate his reception, and make him participate in his own training and that of members of the group, to use the blackboard, etc.

If it is conducted not in the form of learning a whole series of teaching recipes but as a process of changing of attitudes, a seminar of active philosophical reflection on acquiring a feeling for the thoughts of the other person and a respect for his personality, there is no better basic pedagogical training for adults than that acquired through slow assimilation by the future T.W.I. Chief Instructor.

The future instructor of a retraining school for electric engine drivers, having been given this basic pedagogical training and having practiced it in the T.W.I. training session depots, is given a supplementary training lasting two weeks during which he is made aware of the psychology of the adult undergoing training, communication problems, how to adapt T.W.I. principles, which are mainly intended for individual teaching, to the teaching of a group of trainees, and how to prepare and conduct a theoretical talk and a practical exercise; under the guidance of experienced instructors, he gives lessons and conducts exercises under actual class-room or driving school engine conditions.

Monitors:

One element of success; use older instructors and monitors to train older workers.

During the retraining courses, the best older participants are selected; after a certain period of practical work they are recalled to the school to act as monitors to further trainees on their first trial runs during the three weeks' driving course on normal engines. Thus, training in the business for newcomers is provided by fellow-workers.

Emphasis should be placed on the psychological value of this procedure, the monitors have themselves experienced the retraining course as trainees and do not find it difficult to put themselves in the place of those whom they are advising. There is no better encouragement for older drivers undergoing retraining than to see how their predecessors have succeeded by becoming monitors.

The age of the instructors and monitors is one of the factors contributing to the success of the retraining courses.

They know perfectly well how to adapt teaching methods for adults to the personality of older workers by increasing the number of teaching stages and
increasing the time necessary for assimilation; they know how to frame questions and how many to ask, how to encourage the older workers and how to make their success almost certain; they know how they like to instruct themselves, how they put on a front in order to hide their anxiety, etc.; their own age provides the instructors with the key to the psychology of the older workers.

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A word in conclusion:

The success of the training of older workers depends mainly on the sympathy felt for them throughout the entire hierarchy of the undertaking, on a recognition of their dignity and on the respect due to them as persons whose intelligence and free will must continually be used to the best advantage.