

education in leather technology



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T9(M97).2.N7

p7k4

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p7k4

198945

central leather research institute
adyar, madras-20



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adyar, madras 20

madras 1964

cover design : a c basappa

printed at g s press,
mount road, madras 2

foreword

This publication is the outcome of a seminar organised and conducted by the Central Leather Research Institute, Madras in January 1964. The problem of education in the field of leather technology had been engaging our attention for quite some time past and it was felt that it would be opportune to arrange for an exchange of views among all those associated with it by holding the seminar during the Leather Week, concurrently with the Indian Leather Fair and Symposium on Mineral Tannages. We could thus lay claim to the advantage of having had the benefit of the participation and advice of not only educationists in this field, but tanners, industrialists, scientists and students and others associated with the tanning industry from India and from several countries abroad.

The seminar was formally inaugurated on January 27, 1964 by Dr. A. Lakshmanaswamy Mudaliar, Vice-Chancellor of the Madras University who, while wishing the seminar well, cautioned against a dogmatic approach to the question of introducing uniformity and standardisation in educational systems on a country-wide scale. We had also the privilege of the personal participation and guidance of Dr. T. C. Thorstensen, Visiting Professor to the Lowell Institute of Technology, Lowell, Mass., U.S.A. and Prof. A. Kuntzel, Dean, Technische Hochschule für Gerbereichemie, Darmstadt, W. Germany. In the guest-lecture, Dr. Thorstensen stressed on the need for a broad-based education with specialisation in leather technology and expressed the opinion that the Indian leather technologist had everything to look forward to as ours was a developing industry.

As many as twenty-eight papers (four from abroad) were presented during the Views-Forum sessions and these helped to crystallise out the ideas necessary for formulating a broad plan to serve the future needs of the industry. The background note prepared earlier by the Central Leather Research Institute (Y. Nayudamma and P. S. Venkatachalam) was found to cover most of the points made during these sessions and therefore taken as the basis for discussion and formulation of a plan for the future. It is this blue-print note with the suggestions and modifications

brought out during the final session of the seminar that is presented in the succeeding pages.

The organisers of this seminar are grateful to the Council of Scientific & Industrial Research for their financial assistance which has facilitated the active participation of the principals and lecturers of various regional tanning institutes. Our thanks go to the authors of the papers, delegates, visitors and observers from different sectors of the industry, government and educational organisations who participated in these deliberations and to the Chairmen of the seminar sessions viz., Shri Moni Banerjee, Principal, College of Leather Technology, Calcutta; Shri Vasant P. Pandit, Director, Western India Tanneries, Dharavi, Bombay and Dr. G. S. Laddha, Director, A. C. College of Technology, Madras, for their valuable cooperation and guidance of the deliberations in their respective sessions. I should also record my appreciations of the unstinting efforts put in by the Chairman Mr. P. S. Venkatachalam and the Convener Mr. K. C. Shivappa and my various other colleagues in having so ably organised and conducted the seminar.

In bringing out this publication, the Central Leather Research Institute sincerely hopes that the necessary vital link has been provided to the concerned educational authorities to put to action the ideas mooted in the seminar by concretising them in the form of a broad plan to serve the cause of education in the field of leather technology.

C.L.R.I., Madras-20
March 9, 1964

Y. NAYUDAMMA
Director

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**education in
leather technology**

introduction

Definition

It is first necessary to understand what is meant by technical education in leather before one starts analysing its structure or formulating plans to serve its future needs or requirements. It may be pointed out that technical education covers both the training of technicians and the education of technologists. Technological education is recognised to deal with the training of applied scientists and engineers studying for management in the leather industry whereas training of the technicians involves practical instruction in the skills and crafts which play a vital role in the smooth day-to-day running of a tannery. This does not mean that there can be rigid compartmentalisation in the nature of education imparted to both types, in strict interpretation of the above definitions. On the other hand, it is well recognised that the courses designed for the technicians should include a good grounding in the basic sciences and those meant for the technologists provide wide scope for vocational or practical training. In fact controversy stems not so much from a denial of the above principle but from varying interpretations of the degree of practical or theoretical grounding that should be given to each type. Such a controversy has existed before and will continue to exist in future also, so long as the leather industry exists. Only it takes a more acute form in times of stress as now when there is the threat to survival from synthetic materials or when there is an emergency as in the case of a war or—what is true to the present conditions in our country—when there is a great awakening among all the sectors interested in promoting the cause of education in leather technology.

Higher technology

There is also another sphere of training that is covered under technical education, viz., the higher technology courses which aim to produce the research workers, planners and architects of the industry. The M(Tech.) course comes under this category. If the

higher technologist visualises researches and plans, the technologist translates and executes the ideas and the technician acts and produces. The above gives an idea of the distinction and inter-relationship between each category educated and trained under the general scheme of technical education provided for serving the leather industry.

History of education in leather

An understanding of the history of education in the field of leather technology is also useful in developing the correct perspective in assessing its value in the development of the industry and also in visualising its future role in fostering it. In other countries, the history of technical education in any field is associated with the social history of the nation. Technical education in such countries has deep roots in the life and work of the community. It has grown due to the desire for education of men belonging to the under-privileged in society who do not generally have the wherewithal or opportunity for good schooling, who however, want to improve their position in life through the mastery of knowledge. Another major factor responsible for the growth of technical education is due to the growing demands made by the industry for scientifically trained men, following scientific inventions and discoveries. It also stems from a human desire to place traditional practices on a scientific footing and evolve a pattern which can anticipate technological applications. One could thus easily see that technical education had a healthy natural growth and in fact could trace its origin to the period of industrial revolution in such countries. The story is however entirely different where our country is concerned. That the country was not politically independent till very recently is the plausible explanation for this state of affairs. In other words, the country was not allowed to have an industry of its own much less a leather industry. There was naturally no question of an industrial revolution which could spark off the birth and vigorous growth of technical education in leather.

To trace the history of education in leather technology in India is not a difficult task as it is only of recent origin and generally corresponds with the period when leather was started to be manufactured on an organised industrial scale. If it was the E.I. Company that indirectly helped in the organisation of vegetable tanning of kips and skins as an export-oriented industry, it was the

first world war that was indirectly responsible for the setting up of institutions for the teaching and training of technicians who were essential for the supervising of the bulk production of the army's requirements of leather. War is well known as a great promoter of the leather industry and it helped in the setting up of the organised sector of the leather industry in our country which indirectly led to the establishment of training institutions in India. Heavy and army upper leathers had to be made on a large scale and there were not enough number of British personnel to man the industry for obvious reasons. The Government tanneries could not naturally meet the tremendous demand for leather and a few private tanneries were organised by the Britishers to cope up with the demand. These formed the nucleus of the organised sector of the leather industry, Kanpur catering to demands of heavy leather in the North and Madras and later Calcutta specialising in light leather items required both for army and civilian uses.

To meet the requirements of trained personnel for manning the leather industry training institutes were set up first at Madras and later at Calcutta, Jullundur and Bombay. The tempo of production must have fallen considerably after the war but the industry had been set in motion and the need for trained personnel had been created. Nothing noteworthy by way of progress appears to have been achieved in the intervening period till the second world war set the industry on a boom again. At the end of this war, chrome tanning had definitely established itself at Calcutta and Madras and vegetable tanning at Kanpur for the production of finished leathers. Thus the organised sector of the leather industry had definitely been ushered in by the two wars and along with it the demand for trained hands though it was comparatively less than what it is to-day and a trickle of what it will be if the entire leather industry is organised to produce and export finished leathers.

One may well ask how or why the E.I. leather industry is left out of this picture. This industry was practically unimportant as far as the development of technical education was concerned until recently. Though organised into an industry much earlier owing to the trading activities of the E.I. Company, it depended on cottage-developed skills and techniques and never felt the need for employing trained hands. A paradoxical situation surely, for the industry produces a high quality leather without employing a

trained hand in the conventional sense of the term. It provides a powerful argument in favour of the conservative tanner who has a rooted objection to trained hands. With a little twist it becomes an equally potent weapon in the hands of a trainee-protagonist. To-day, however, most of the E.I. tanners have gone in for mechanisation to get over labour problems like higher wages, strikes, etc. The old type E.I. tanner is finding it increasingly difficult to survive. Unless he adapts himself to changing conditions, he will gradually fade out of the picture. This is an instance to indicate how social changes bring about far-reaching changes in an industry also. It has been observed earlier that a study of social history is essential to understand the development of an industry. Where mechanisation has been introduced, the E.I. tanner has naturally to make changes in the process to produce leathers of the same traditional character and generally seeks the aid of technicians. He has also taken to new lines of production and feels the need of technicians all the more. This is bound to have profound influence on the demand for trained personnel as the E.I. tanners form the bulk of our exporters and hold a major share of our industry. The industry is actually undergoing a profound change. In other words, the industrial revolution is happening to us right now.

Technologist's duty

'As technicians and technologists, what are we going to do about it?' is the question. The chances for employment are definitely going to be favourable for the technicians and technologists. Are they prepared to do a bit of stock-taking and make sure that they discharge the trust placed in them by the tanners with credit? It is needless to point out that by serving the tanner they are serving themselves and also the leather industry as a whole. It is in this context only it is felt necessary to have a close look at our system of education and training. Hitherto the tanners' employment of trained hands has been tardy and sporadic to warrant any undue enthusiasm on the part of the students of the technological courses or their teachers. The recent spate of public sector employments of trained personnel has only served to harden us towards the tanner and might have even encouraged us to adopt a cynical attitude of disbelief in his employment potential. In the circumstances it is quite possible that we have not given the necessary bias in imparting training to suit the tanners' requirements. This aspect also needs careful re-examination.

Need for planning

There is another important factor that is bound to condition our thinking in this matter. How far and how soon will the synthetic substitutes succeed in ousting leather from its various fields of uses? In other words, 'how far can we see into the future of leather and incidentally to what extent can we predict the future of trained personnel?', is the problem. Without doubt, this problem requires careful analysis and should be juxtaposed with the more sanguine picture caused by the industrial ferment taking place in the field of leather manufacture in our country.

Impact of synthetics

Every one will agree that leather is not going to vanish now that the synthetics have arrived. As long as animals die and are slaughtered for meat, their skins have got to be processed and utilised. Unless they find a revolutionary or novel use, they will continue to be produced into leather possibly by adopting unconventional techniques. It is well known that the consumption of leather by the developing countries is on the increase. It is also recognised that very soon when the developing nations further improve their standards of living and consequently increase consumption of leather, the world's output of hides and skins will not be in a position to meet the demand for leather. There is therefore reasonable chance for leather and its synthetic substitutes to co-exist just as in the cases of rubber and the textiles. This does not, of course, mean that there will not be any repercussions as in the case of sole and upholstery leathers which have been replaced to a major extent by substitutes in the West. There are bound to be repercussions with far-reaching consequences though they may be somewhat slower to create an impact on the industry of the developing nations.

Need for higher course

However, we cannot afford to remain complacent about it but should face the challenge by visualising its consequences and meet it more than half-way. One way of meeting the challenge is to provide the future leather technologists with the right kind of training. Cutting down process costs by means of mechanisation and automation, or evolving revolutionary and economic methods of processing, finding newer uses of leather, promoting greater sales of leather by providing well-informed publicity to its superior

Properties are some of the methods by which the inroad of synthetics can be combated. Engineering, productivity methods and business management should receive greater emphasis in the courses. Original thinking should be encouraged and generous scope provided for doing research. There is thus a need for a higher technology course in leather. Even courses for the lower awards should include workshop practice in the curriculum and a study of the working principles of most of the tannery machines. In short, the need for research is greater than ever in the field of leather technology and the survival of leather may well depend on how well or efficiently it is organised and conducted.

Need for modernisation

Besides the reasons described in the foregoing pages justifying the necessity for examining our system of education, there is another equally good reason for bringing our courses and curricula up-to-date in view of the rapid pace at which scientific and technological advances are taking place in this world. This is necessary for the survival and usefulness of technical education itself.

It has thus been shown that there is a real need for re-evaluating the system of education in leather, in view of the ferment in the industry, the imminent battle with the synthetics and the necessity for realignment with the rate of changes of the other sciences and technologies.

institutions working arrangements and courses

Origin of educational institutions

Technical institutions are generally recognised to grow up in response to local needs, increasingly to regional requirements and in times of emergency to meet national needs. By local needs, we mean essentially the requirements of the local community and industries. In our country to-day there are seven regional institutions catering to the training of technicians and two colleges of technology one in Calcutta and the other at Madras, training technologists at the degree level. There are a number of other courses too at much lower levels run by various organisations. These will be taken up for consideration in their appropriate contexts. That geographical factors have played a dominant role in influencing the location of the majority of these institutions, is quite clear from the fact that they are situated in Kanpur, the centre of the heavy leather industry, Calcutta and Madras centres for light leather industry, Bombay, centre for textile leather goods and Jullundur where sports goods leathers are made on a cottage scale basis. The location is particularly important as technical education cannot be imparted in ivory towers and the institutions will have to be in close touch with the industry's needs and problems and throughout seek the industry's co-operation in providing the necessary inplant training for the students.

In this context it is necessary to point out that some States which are rich in natural materials like raw hides and skins would naturally like to develop their own tanning industry and establish training institutions as part of a plan to achieve this object. While this is certainly a laudable aim, it should be mentioned that in the absence of a well-developed industry to provide the necessary training ground for and later absorb the technicians this may prove a venture of doubtful value unless they have State-owned or aided industries to serve a similar purpose.

Types of courses

Generally three types of courses are offered by these institutions. The diploma course is run for 2 or 3 years for matriculates,

followed in some cases by a compulsory period of inplant training, the degree course for 4 years at Calcutta for students at the higher secondary level and 5 years at Madras for those passing out of the Pre-University course to be followed by the post-graduate course (M. Tech.) for two years; artisan courses for periods varying from one to two years, meant for students from the backward communities who do not have the requisite educational qualifications, the object being to train them into good machine operatives or mistry type workers. Refresher courses find mention in one or two prospectuses, but it is exceedingly doubtful whether anybody from the trade makes use of it. In short, the courses offered are mainly full-time courses. Short term and part time courses like evening courses, 'sandwich courses', summer courses and exchange courses significantly enough, do not find a place in the picture. It is hardly necessary to mention that such courses are essentially patronised by men from the industry. It would therefore appear that there is exactly no clamour from the industry for trained hands. If we examine the picture more closely it will be clearer that even a majority of the full-time candidates are placed in the public sector departments. The picture certainly becomes very confusing at this stage. Many questions will immediately arise in one's mind. Technical education was earlier defined as designed to suit the industry's needs. Here we have the paradoxical picture of the same education catering to the requirements of organisations, very few of which are run as an industry.

Public sector employees

Let us examine what exactly the public sector departments do. Some of them offer advice to the trade on technical and financial matters and very often act in an administrative capacity. Where such departments run an efficient and effective extension service, they continue to be in touch with the problems of the trade and are in a position to make useful contribution to the industry's progress. Such cases form the exception rather than the rule. Generally these departments run to seed early and become symbols of bureaucracy rather than the nerve-centres of the industry. In short, all the technical training imparted to such personnel has failed to serve the purpose or in other words failed to reach the industry. There is therefore an urgent need to examine as to whether this is the right way of canalising the benefits of technical education in order to serve the industry.

Tanners' response

The two most immediate questions that occur to one's mind are, whether we are giving the right type of education to the trainee that can be cashed readily by the tanner or whether the tanner has not been given an opportunity to assess the worthiness or usefulness of trained candidate under his conditions of working. The tanner is generally a shrewd businessman above all other considerations and can be expected not to ignore anything that is likely to be of potential value to him. On the other hand, it is quite possible that he is averse to experiment at his own expense regarding the potential worth of a trainee. Under the circumstances, it will be necessary to educate the tanner, even at the rate-payers' expense. This two pronged education will be quite essential initially to break the icy crust of the tanners' conservatism, if technical education in leather is to become meaningful and make further progress.

Need for caution

It is hoped to deal with these two aspects of education in the subsequent pages but before that is done, it is necessary to indulge in a bit of heart-searching and consider whether it is not really the system of education that suffers from the lacunae that are responsible for this state of affairs. Therefore in examining it and suggesting its modification, care should be taken that it envisages accurately the industry's requirements during the next 10 years or so, for while it is true technical education systems frequently undergo changes unlike those of the arts and sciences, and hence necessitate frequent changes of syllabi, etc., it is also necessary to stress that great control should be observed before making such changes as the right solution is often difficult to foresee and fast progress in the wrong direction can be disastrous. In this context, it is useful to draw one's attention to the frequent changes made by the States with regard to their systems of school education and the confusing and frustrating results that followed only to produce a general lowering of standards among university entrants.

Different organisations

Technical training is imparted at varying levels by various bodies. Besides the courses mentioned earlier, which are actually run either by the States or the Universities, there are also courses

run by the following organisations. The Khadi and Village Industries Commission, the State Khadi Board, the Small Industries Service Institute, The State Community Development Organisation, the Sarvodaya Sangh and the State Co-operative Department etc. through their service centres run artisan courses in machine operation and tanning for durations extending from 3 to 12 months, the students generally being entitled to a monthly stipend of Rs. 30-40/- each from allocations by the Planning Commission, through the Social Welfare Board, Community Development Department, Harijan Welfare Board etc. While none can dispute the basic principles on which such schemes are founded, it is nevertheless necessary to examine the workings of such courses and make sure whether they are run on correct lines, whether it is subject to inspection by educational authorities and training imparted is done by qualified hands. Dispassionate analysis of this aspect of training is essential as metabolic malfunctioning of education at this level can lead to the poisoning and crippling of the main blood stream, viz., the training of personnel for the organised sector of the industry.

Reasons for plurality of courses

It is necessary to understand the structure of the tanning industry in order to develop an appreciation of the reasons for the existence of such a plurality of courses. It is well known that the industry consists in the main of the village, small-scale and the organised sectors. The above-mentioned short term courses are apparently designed to feed the requirements of the village and small scale tanners. However, even here, the majority of the trained hands are taken by the public sector enterprises except perhaps for the machine operatives for whom there is a genuine demand both by the small scale and organised sectors. These make-shift training courses may be found useful to bolster up the village industry and effect decentralisation of the industry aimed at an improvement of village economy and setting up of healthy competition with the small-scale and organised sectors. However, our leather industry is an export oriented industry and is sustained mainly by the small-scale and organised units which depend on the villages to supply the raw hides and skins required for processing. There is therefore a need for planning the education of personnel meant to serve these three sectors and the authorities concerned should have a proper appreciation of the scope for

development of the village industry and its future role in the economy of the nation as distinct from those of the small scale and organised sectors and take care that confused planning of education does not throw them into conflict with each other as this might involve the serious risk of crippling our export industry. In other words, the educational policies should conform to the plans for the future framed by the industrial policy makers of the State, e.g. the Planning Commission, the Leather Development Council, etc.

Repercussions: Another undesirable result of such courses will be the repercussion it produces on the training of the diploma and degree holders. Even under existing conditions the full-time trained personnel find it very difficult to secure employment in the private sector of the industry. The mistry type trainees that will be turned out by these short courses, will naturally be cheaper and the tanner impelled by false reasons of economy might be inclined to employ such personnel. Obviously such a step will not be conducive to the progress of the industry. It is thus seen that unless care is taken to see that these courses are conducted on proper lines, indiscriminate running of such training courses may lead to serious fall in the quality and quantity of production particularly for export. It is not denied that training courses are useful to village tanners, but they should be planned and conducted on a rational basis and meet with the approval of a Central Advisory Board created for technical education in leather who will be also responsible for suggesting the curricula, etc., of the educational institutions in leather. The crux of the problem is that a good hide or skin that has a potential export value should not be put to wrong use by an over-enthusiastic village-tanner as a result of the training given in such courses. The responsibility is too great and the implications are too far-reaching to be left to the good sense of a village tanner. A central body of educationists and tanners will be in a better position to prescribe what is good to be taught to a village-tanner and what is not.

Diploma courses

It was earlier indicated that a search should be made into our system of education imparted to diploma and degree holders in order to make it more appealing to the tanner. The diploma course will be taken first for consideration.

Recruitment: Students are taken at the matriculate or S.S.L.C. holder level, who must have studied mathematics and the scien-

ces, chemistry and physics. Candidates who have passed the intermediate examinations and those who hold degrees in science are also admitted and exempted from attending lectures on science subjects and mathematics and doing laboratory work, if any, in these subjects.

Selection: In recruiting a candidate for the course, three aspects have to be taken into consideration. If merit alone is to be taken as the guiding principle in recruitment, while it may help to produce a greater percentage of successful candidates at the end, it need not necessarily turn out trainees with an aptitude for the crafts and skills. Selection by interview has much to commend itself, as it provides an opportunity for the recruiting board to size up the applicant and judge his potentiality for serving the industry. This should not, however, be the sole method by which a candidate should be judged, for though very useful as an adjunct to the written examination method of selecting students, if employed alone, it may involve a margin of error as high as 100% in some cases.

The third method which is perhaps the most ideal of the three is to select industry-sponsored candidates. The advantages of this method of selection are obvious. The candidate has no problem of employment when he finishes his course. Throughout he shows an attitude of responsibility and is generally no problem-student to his teachers. The inherent weakness of this method of selection is the fact that generally industry-sponsored candidates are at best of average ability and pull down the standard of training imparted to the students. There is also a set of the so-called industry sponsored candidates who are really the problem children of technical institutions. The onus of responsibility really rests with the tanner in such cases for when he recommends candidates for recruitment, he should take care to see that they possess a proper sense of discipline and responsibility particularly when they are likely to occupy managerial posts in his organisation or even succeed him.

Distribution: An ideal method of recruitment will be to allot 50% of the seats to the industry-sponsored candidates and the rest should be selected on the basis of merit as well as their performance in the interview. It may be necessary to increase the number of seats set apart for the industry recommended candidates, with increasing progress made by the tanning industry for a number of

reasons. The training institutions will earn the confidence and co-operation of the industry. Placement of the trainees in the industry will not be a problem. Partnership with the industry will be a reality and the courses will acquire a practical bias as a result of the close contact with the industry. Further advantages and other aspects pertaining to this method of recruitment will be dealt with when 'sandwich' courses are taken for discussion.

Duration of diploma courses

A three-year duration appears to be reasonable and is followed by most of the institutions. It will perhaps be difficult to impart satisfactory instruction in all the subjects in two years. This will be more apparent when the subjects are considered in detail. It may be mentioned that the institutes in Madras, Bombay and Morar run three-year courses whereas those in Kanpur and Jullundur run two-year courses. Even where the institutes have similar duration of courses, the subjects covered may be different. For example, in the Madras course, english, physics, mathematics, physical testing and sanitary engineering do not find a place and in the Bombay course, management, leather trades engineering – though this is perhaps covered under principles of engineering, electrical and mechanical engineering etc.— and optional subjects like leather goods, glue etc. are missing. In both the courses, scientific control of tannery operations, a very important subject, is missing. The subjects should include english, physics, chemistry (organic, inorganic and physical), mathematics, leather trades engineering, leather manufacture, analytical chemistry, scientific control, chemistry of leather manufacture, microscopy and microbiology, physical testing, cost accountancy, economics and management, sanitary engineering, works practice and laboratory practicals. This is an impressive array of subjects and will take a minimum duration of 3 years for reasonable coverage. The need for the teaching of the above subjects is indicated below.

Subjects

(i) *English*: English is a 'must', as the medium of instruction in teaching of technological subjects will continue to be English for many years to go yet. As the sciences had been taught in the local languages at the schools, there is need to get acquainted with scientific terms in English and also to think and write in the same language if they are to follow instruction in the other technical sub-

jects. It is suspected that the students do not pay as much attention to English as they ought to as no Board examination is conducted on this subject. This is a defect that has to be remedied forthwith so that the students will attain reasonable proficiency in the language and achieve as a result better grasp of the technological subjects.

(ii) *Sciences*: The science subjects, physics, chemistry and mathematics are really ancillary ones, but are responsible for laying the foundation to the edifice of technological knowledge. They have been treated in step-motherly fashion so far, but it is time they are brought on par with the technological subjects from the examination point of view. These should also be included in the list prescribed for examination by the Board. Such inclusion will help to pull up the very standard of the course particularly in view of the stiff problems the leather technologists are expected to face, confronted as they are with competition from the plastics. Besides it will help the diploma holders to secure ready exemption from appearing for examinations in these subjects, if they join the degree course.

(iii) *Other subjects*: Amongst other subjects recommended for examination by the Board, are leather trades engineering (practicals), scientific control of tannery operations, cost accountancy, economics and management. A basic knowledge of engineering is necessary to streamline production and this should be tested by holding a practical examination. Sanitary engineering may be coupled with this subject in theory, as the problem of effluent disposal is assuming greater proportions keeping pace with our expanding industries. Cost accountancy and management may be combined together to form a paper. The important point that should be emphasised in this context is that unless a qualifying examination is conducted in a subject, the student never takes much interest in it. These subjects have become too important to the tanner to be dismissed with mere indication in the prospectuses or a sterile course of pious lectures.

The course and inplant training— sandwich course

It is in this field of courses, there is a real need for reexamination in order to make the diploma meaningful. Whether the full-time course that is being run presently followed by the inplant training does really serve the needs of the industry is the question. If it does not, what are the alternative courses? Of all the courses

that suggest themselves for consideration, the 'sandwich' or co-operative course appears to be the most promising. In a sandwich course, layers of study in the technical institution and industrial experience alternate each other over a period of years. As an example, a student will work in a tannery for six months followed by six months in the educational institute and will continue in this manner for a fixed period of time till he appears for an examination and gets his diploma. Thus industrial experience falls within the period of training and does not follow the course, as it does according to the existing systems. The student thus gets an opportunity to work in the industry even during the formative stages of his education and this factor alone makes him appreciative of the need for developing an industry-oriented attitude which is essential for his success as a technician. The industry has also an early opportunity to mould him and as such may not view him as an outsider. This helps to build up a healthy psychological relationship between the potential employer and employee. At present when the student enters the industry to do his inplant training, he often adopts supercilious and superior attitudes which are apt to be found very irritating by the tanners.

Advantages: Another advantage of this method of training is that the tanner has an opportunity to study the trainee at close quarters, select him and if necessary arrange to give specialised training to fill a particular vacancy in his organisation. The trainee also learns to work under varying conditions, with different people and get acquainted with a number of distinct practices and operations before rather than after the completion of the course. More often than not, working in the industry during the course means that the student works with more modern equipment than where his experience is confined to work in the institution only. Yet another point in favour of such an arrangement will be the closer collaboration between the industry and the institution which is vital for the healthy existence and growth of any institution imparting technical education.

Drawbacks: Let us now take a look at the debit side of such an arrangement. How far the industry will agree to provide and cooperate in this partnership for training will be the vital question. Judging by our past experience, one might be tempted to dismiss the whole idea of a sandwich course as impossible. There is some justification for this view as we cannot possibly force a

system on an industry which does not want it. Even with the full cooperation of the industry, administration of the course may be found to be a problem. However, the course is too full of promise to be dismissed totally and should be introduced at least on an experimental basis, where tanners' cooperation is forthcoming. In this context reference should be made to the courses conducted by the Central Leather Research Institute and probably other organisations who take candidates from the trade at the latter's request and give them intensive practical training in one or two branches of leather manufacture for 3-6 months and send them back to the tanners. A sandwich course will involve similar cooperative effort on a much wider scale between the tanner and the teaching institutions for its success. It may also be mentioned that this will be the only method by which the tanners and the educational institutions can be brought to close grip which is probably the only healthy way by which partnership can be built between the two.

Part-time and evening courses

These are essentially meant for those who are already serving the industry and who wish to qualify themselves further. At the moment there is little or no demand for such courses. It is necessary to bear in mind that such courses can be run with success only when the teaching institution is situated right in the midst of the tanning industry or when there exists a quick and efficient transport system linking both.

Special short-term courses

These courses are somewhat different in pattern from the full time and part time courses. Here students particularly those from the trade would like to do an intensive course in a specialised subject for a short period, which might or might not terminate in their taking a final qualifying examination. No special separate courses need be run for this purpose, but the students may be allowed to sit with the full time students for a course of lectures on the particular subject. Care should be taken to see that the subject is covered in the minimum possible time in a continuous series of lectures, so that the student can rejoin industry as early as possible. These short specialised courses should attract the interest of the trade, if care is taken to emphasise the modern developments in the field and efforts are made to publicise the courses well amongst the tanners. The important

feature about these courses is that it will not insist on a minimum educational qualification for attending the course. The basis should be that as long as the trainee is sponsored by the trade, he is admitted to the course. This course should also be given a serious trial by the educational institutions as it will provide an opportunity for closer contact with the industry.

Extension courses

These are not separate courses but are really a series of lectures offered by technologists, engineers and chemists drawn from the trade. Such courses should be made compulsory for all students doing their final year in the institutions and are valuable serving as the first link between the training institutions and industry. Partnership between industry and education is always difficult to achieve in other fields of activity, but mutual co-operation has never been found lacking in this effort provided the teaching institutions make a sincere attempt to arrange for these lectures.

Inplant training

The importance of this aspect of a student's training can never be over-emphasised. Unfortunately, neglect of this part of the students' training alone has been responsible to a major extent for the lack of partnership between the industry and education and has caused no end of frustration and bitterness among the students. Inplant training is designed as a part of the course, and the student actually continues his course even during this phase, though he does not appear to be aware of its importance. It is designed to provide him with an opportunity to apply theory to practice and readjust his ideas continuously during this process. This readjustment is essential, if he is going to be of any use to the tanner. In this process of readjustment he has to go alone, as there is none to guide or help him, situated as he is in an atmosphere alien to him. He is often bewildered by the amount of 'unlearning' he has to do. Trainees who are not amenable to this rapid psychological and educative readjustment react strongly to it straining thus their relationship with the tanner.

Breaking in: One method of avoiding such undesirable effects is to gradually 'break' in the student to the practices and methods of the practical tanner. The educational tours and visits, though

informative are still impersonal and do not produce the same impact on the student's mind. The effect is kaleidoscopically pleasant and stimulating but not lasting. While on this subject of tours mention should be made that it will be beneficial if all the groups join them every year as in this way, a student obtains more than one chance to see the tanneries and to that extent his impression of the trade will be less ephemeral. The 'breaking' in of the student can be done more gradually and in stages in the 'sandwich' course. Another suggestion made in regard to this problem is to have the inplant training prior to the course. This will certainly provide the trainee with the necessary bias for practical work but the long course of 3 years without any intermediate or follow-up inplant training may blunt the beneficial effects of the preliminary training. Judicial 'sandwiching' of work-training is perhaps more ideal but administratively more difficult to arrange for and manage.

Need for vigorous application: Another view on this subject of inplant training, also deserves serious consideration. Much of the failures attributed to the present system is due to the tardy and feckless manner in which implementation of the programme of inplant training has been carried out. Some institutions make inplant training only optional. Others arrange for inplant training in the Central Leather Research Institute. Even though the facilities available may be adequate for such training, this can never be considered equivalent to the training in the actual factory. In some cases, training is fixed for too short a period (e.g., 3 months) to be of real benefit to the students. It is thus clearly seen that inplant training which is probably the most important phase in the education of a leather technologist has been made ineffectual and meaningless. This is another aspect of the weak and unsound partnership that exists between education and industry.

Remedial measures

The following remedial measures are suggested to improve the situation. The tanner is squarely to blame for this state of affairs. He has taken the position that the student is learning at his expense. He feels, justifiably so perhaps that his process arrived at after years of sweat and toil should not laid open to every newcomer to his tannery. In the circumstances, he views every trainee that comes to his tannery as an intruder. If tech-

nical education in leather is to succeed in its objective, it is incumbent on the educational authorities to change the tanner's attitude both by persuasion and providing him with an incentive to take students for practical training. Fortunately, the climate is very favourable as quite a few tanners appear to be aware of the inherent advantages of cultivating the philosophy of enlightened self-interest in formulating their business policies. The State or Central Government could provide the incentive by allowing facilities for import of machinery or chemicals, the amount to be determined on quota basis depending on the number of students trained by a tanner. Another method is to make the tanners responsible for the education of the students by providing them with liberal representations in the governing bodies, advisory councils and other organisations responsible for the education of the leather technicians and technologists. If persuasive methods fail the government may have to resort to legislation thus forcing the industry to accept the students for training. This aspect of relationship between industry and education will be dealt with, later in detail.

Training period

Taking that facilities are available in the industry for in-plant training, a scheme may be drawn on the following lines. The training period could be conveniently fixed as one year. Alternately this can be sandwiched conveniently for two or three months during the summer after each academic year. During this period, the student will draw a stipend from the State or Central Government so as to promote the smooth pursuit of his training without any financial worries. The period of one year will provide the tanner with an opportunity to study the trainee and mould him if he finds him suitable for employment in his work.

In short, the three-year diploma course followed by one year of compulsory in-plant training will serve the purpose fairly adequately, if the 'sandwich' course for a duration of 4 years is felt to be administratively difficult to run.

Vacational refresher courses for staff and students

Refresher courses for staff of the educational institutions are necessary and should be conducted in a research institute doing advanced work in the various subjects connected with the field. This is essential if the students are to be instructed in the most modern concepts and developments in the particular field of the industry. Otherwise the students will continue to imbibe rusty

knowledge which will be of no use to the industry. Such summer courses are of particular importance considering that modern technology advances at a very rapid pace. For the same reason, the staff should find opportunities to spend their summer in tanneries as it will in its own way help to provide the necessary practical bias in their teaching of the practical subjects. An attempt has already been made in this direction by some institutions, but this should be promoted and pursued with vigour.

Research

It is absolutely necessary that research is conducted in the applied field by all the teaching institutions. This will involve routine analysis of samples and leathers from tanneries and tackling of ad-hoc problems pertaining to the regional industry. For one reason, this will help the staff to keep abreast of modern developments and thus stimulate and keep their interests alive in the various subjects. The more important reason however is that it will help to build a healthy and lasting partnership with the industry. The regional problems of the industry should be surveyed and tackled by these institutes, in order to win the confidence and gratitude of the industry. If necessary, they may work in coordination with the extension departments of other organisations operating in this region. It is useful, here, to touch upon how the Central Leather Research Institute has established healthy partnership with the industry, making full use of her opportunity to do research for the industry. Teaching has been combined effectively with research and a number of personalised courses are run successfully for industry-sponsored candidates simulating the sandwich courses described earlier. Besides this, facilities are offered for the inplant training of 20 odd stipendiaries from the various regions of the country. Training is also given to candidates from abroad. Refresher courses are run for candidates sponsored by international organisations. It is, of course, well known that the leather part of the course for the leather technology graduates of the Madras University is again run by the Central Leather Research Institute. It is thus shown that research will prove the most effective means by which educational institutions can build up partnership with industry.

Syllabus

The syllabus is important in that it determines the scope for instruction and examination in a particular subject. If the course

for the diploma is going to be rationalised at the national level, the syllabus also has to be automatically rationalised. Rationalisation is essential for standardising the level of instruction imparted in the various institutions in our country. This is necessary for planning the needs of the industry in the matter of technically trained personnel. In other words, the industry or the Government can be sure of the nature and quality of the service they are employing when they recruit a diploma trainee, whether he comes from the far South or the extreme North. This may well play a vital role when the country is facing an unusual situation, viz., a national emergency, etc. The fear that such rationalisation will rigidify the structure and stultify the quality of education is unfounded, for anyone who has experience of teaching knows that the syllabus prescribes only the minimum scope and it does not prevent him from setting up a high standard of education by expanding it. For the same reason, the fear that such strengthening will not provide sufficient scope for orientating education to regional needs, is not justified. The drawing up of the syllabus should be taken care of by the Central Advisory Board for technical education who can form the necessary sub-committee for this purpose.

Syllabus for village courses

The question of prescribing syllabi for the village-level courses should also be given careful consideration. These were originally designed to train the village-craftsman who tans his own leathers and produces goods out of them. Some of them have their own prescribed syllabi and are organised and run efficiently. As pointed out earlier the syllabus should meet with the approval of the Central Advisory Board for education in leather. So long as these courses are run for producing craftsmen, artisans and machine operators, no serious differences could arise regarding policy matters. The training of craftsmen should necessarily be conducted by such organisations as it is most suited to preserve the originality and regional genius of his art. Where the syllabus envisages the impartation of theoretical knowledge, and consequently running of a more formal type of course, it is necessary to subject the organisations' capacity and facilities to scrutiny and approval by the authoritative body. For it should be emphasised that an educational institution in leather is better equipped and better staffed for such training than other organisations. And their certificate course is actually designed to serve this purpose.

It is rather difficult to decide what should be the limiting factors for the syllabus of the village-level course. A conventional scheme will cover organised collection of hides and skins around villages, correct methods of flaying, curing, grading and vegetable tanning the inferior selections. A more imaginative and perhaps positive syllabus should envisage the village-tanner as a cottage-scale industrialist meeting ultimately the entire indigenous demand for our requirements of leather, with the organised sector looking after the production of export quality leathers. To a large extent, this will depend on the policy of the government as regards the shaping of the future of the tanning industry. For these very reasons only, it is pointed out that investing a central body with authority for directing the running of these courses is essential, not only for the future advancement of education in the field of leather technology but for the progress of the industry itself.

Facilities (equipment)

By facilities we mean essentially equipment made available for practical training. This can be divided under two heads, viz., laboratory practicals and works practice. Equipment for laboratory work is generally provided in all training institutions. Though sufficient working space is provided, there is however lack of modern equipment. Some institutions cannot even boast of the possession of a pH meter. Possession of a minimum number of standard instruments and apparatus should be insisted upon. With the accent on physical testing today basic testing equipments like tensile strength tester, abrasion meter, shrinkage meter should find room in any modern laboratory devoted to teaching and training of technicians.

Tanning equipment and all basic items of machinery should be provided in the tanneries attached to the teaching institutions. The fundamental guiding principle should be to offer facilities to the individual student to process leathers independently or at least in partnership with not more than one student. A drum or paddle or pit to student ratio of 1 : 2 is ideal for such purposes. As mechanisation is the order of the day as far as possible all operations should be done mechanically by students. It is therefore necessary that the tannery is fully mechanised. It is not, of course, possible to keep on adding all the latest machinery as and when they are developed. Machines will always grow obsolete. Periodical visits to tanneries, vacation training and 'sandwiched' training

courses in tanneries are all designed to make up for this drawback which is unavoidable.

Library work

A modern library, well-filled and well-catalogued is essential to supplement education particularly in any technological institution. Library hours should be set apart for the students in the time-table and they should be required to submit a condensed record of their study. This will help to cultivate among them a tidy mental habit, an essential requisite for a technician. The lecturers also should take pains to keep themselves well informed of the latest developments in their particular subjects and should give references in their lectures to published work in journals.

Text-books

It is an unfortunate fact that no text-books on leather are available in our country. The only book that has been useful in filling this gap is now obsolete. Efforts should be made to bring out new text-books that deal with our conditions and problems. Such books should be amended and re-edited periodically, in order to make them up-to-date and serve their purpose. The Central Advisory Board can nominate a sub-committee to go into this question and provide it with the necessary financial and other facilities.

Examination

A Central Board of Examiners, drawn from the staff of the various institutions concerned with the technical training of personnel for the leather industry, may be constituted for evaluating and assessing the proficiency of the trained students by examination at the end of the course. This will considerably help in producing trained personnel of an uniform level of attainment irrespective of the institute in which he is trained.

The examination should include a practical test where the student will himself have to produce a pilot lot of leathers the sales value of which will be assessed by a panel of practical tanners and marks awarded accordingly. The panel will also subject the student to a viva voce test. This will help to provide the examination with the much needed practical bias that is so very

essential to make evaluation of the student's attainments really complete.

Degree course

Recruitment for the degree course can be based on the same considerations as for the diploma. However, considerable divergence of views is likely regarding the qualifications for the entrants of the course and type of course that should be offered etc. Before this aspect is considered it is necessary to understand the needs of the industry for degree holders, the origin of the course and visualise the future role of degree holders in the leather industry.

The degree course in leather technology was first introduced by the Madras University in 1945 when the Alagappa College of Technology was started to cater to the needs of the major industries of the State for trained technologists. As the leather industry happened to be one of the major industries of the Madras State, the need for training technologists to take care of the industry's future was considered necessary and imminent. It is useful to point out here that at the time of introduction of this course there was no actual clamour or demand from the industry for trained technologists. It is significant that out of the 90 odd technologists that have been turned out of this institution in the past 15 years, hardly about 10 have found placement in the private industrial concerns. All the rest have been absorbed either by the government or quasi-government organisations or by the Central Leather Research Institute, Madras. The Calcutta College which started training graduates since 1956 onwards, are facing a similar situation. This unwholesome ratio of employment is not entirely due to the indifference of the industry but to some extent due to the technologists' negative response to the industry's needs, as will be shown later.

Tanner's view

Let us examine how the tanners have reacted to this question of employing technologists. The village and small scale tanner has apparently no need for a technologist. The organised sector tanneries have taken a few but do not show signs of taking more.

It is probably because they feel that the technologists are too expensive to be taken in large numbers. To start with, a technologist has to be paid at least twice of what is paid to a technician. According to tanners a technologist is able to offer a more rational or plausible explanation for the existence or occurrence of a defect or difficulty but where it comes to putting it right, he is as good or as bad a guesser as a technician. Hence their disinclination to employ a technologist and pay him more.

Public sector outlet

It is a safe guess that an ugly future might have been in store for them but for the setting up of the Central Leather Research Institute, the Small Industries Service Institute and similar quasi-government organisations, which could offer them ready openings as technologists, research chemists and administrators. They have continued to absorb them but now these organisations have reached a state of saturation and may not be in a position to employ them in any considerable proportions in future. This is one of the reasons that have compelled reexamination of this question of training technologists today.

The question

The question that looms large before us is 'Are we going to continue producing these technologists?' The answer is emphatically in the affirmative. Let us now examine the reasons for our taking such a positive stand in this matter. The least important of the reasons is of course the factor that the course will continue to function for some more years with diminishing momentum under the influence of adverse conditions unless something extraordinary happens to effect its premature closure. The potential fields of employment for the technologist are the leather industry, the auxiliaries industry and the public sector with its curtailed scope for employing the higher technologist and the researcher.

Technologist and technician

It is a fact that the leather industry has never taken kindly to the technologist probably because the tanner has never felt the need for one so far. In this context, it is necessary to distinguish the technologist from a technician to develop a proper appreciation of the tanners' point of view. The technologist is to a certain extent a technician but in order to function effectively he should

be more of a scientist, an engineer, a manager or an executive. One should remember that a technologist as defined above costs at least twice as much as a technician. No tanner in his senses will employ a technologist paying him twice or thrice as much as a technician where he is only in need of the latter's services.

Requirements of trained personnel

Now what have been the leather industry's requirements of technologists in the past 10 or 15 years? In order to understand it we should trace the history of the leather industry's development during the period. There were few organised tanneries or chemical auxiliary industries in India that required their services. A few of them who did require men for managerial posts etc., had their own courses of apprenticeship and trained their men from whom they drew their requirements after having given them intensive training. As regards the auxiliary industries, they were practically non-existent. Until recently the demand for trained technicians was also not encouraging. Today the picture is much brighter. With the development of the finished leather industry more or less in the offing the tanner is going to enter a more competitive market, when the employment of a technologist who is going to take care of his business management, market-study and productivity problems will become a necessity.

There is already a growing demand for trained technologists. It is an unfortunate fact, however, that the technologists' response to this has not been positive. He is inclined to look for a softer and more secure job nearer to his home or in a modern city. It is hoped that this is only a passing phase which will disappear when the industry offers better terms of pay and security and when the public sector can no longer employ them as will happen very soon. Likewise, with the development of the chemical industry, the employment of technologists to develop the application of new products in the leather industry becomes obligatory. Arguing on similar lines and taking in view the threat posed by the synthetics, the need for the higher technologist or researcher is all the more urgent. The last mentioned category will find placement essentially in public sector organisations. Having established clearly that the industry and allied organisations are definitely going to need the services of leather technologists in the near future let us now devote attention to the formulation of

the courses and syllabi keeping in view the future roles expected to be played by them.

Recruitment level for degree courses

Recruitment can be conveniently done at the higher secondary or P.U.C. level as is in vogue at present. This helps to provide the bias for the subject early in the student's academic career and develop in them a proper appreciation of their responsibilities. Nevertheless it is also true that the B.Sc., B.Sc. (Tech.) students in leather performed better in the examinations and created a more favourable impression than the B.Sc. (Tech.)'s. In fairness, it should be mentioned that in works-practice the B.Sc. (Tech.)'s proved themselves somewhat superior to the double-graduates, probably a direct result of the greater duration of practical training put in by them. It is suspected that the slight advantage enjoyed by the B.Sc., B.Sc. (Tech.)'s was due to their better proficiency in English which they had studied upto the graduate level. It is necessary to point out at this juncture that a sound knowledge of English is an essential prerequisite for a thorough understanding of technological subjects as the latter are taught in that language. This aspect of the problem is worth investigating and if the view expressed above is found to be corroborated, immediate steps should be taken to upgrade English and higher attainments prescribed for technological courses.

Diploma and B.Sc.(Tech.)

It is often found that a diploma holder in leather technology is anxious to improve his qualifications by studying for the degree course. It is naturally impossible to run special courses for such candidates. It is also not fair to bar them from appearing for a degree. A possible solution is to make them appear for a qualifying entrance examination in the common subject. If successful they may be allowed to attend classes in chemical engineering and other subjects along with other students, complete the courses of lectures and pass the respective examinations, and thus qualify for the degree. This may take well over three years. As far as possible accommodation of time-table should be made so that they complete the course within the minimum period of time possible.

Similar facilities are sometimes sought for graduates in chemistry. While they may be exempted from attending classes

in english, mathematics and the sciences, and doing the corresponding laboratory practicals, it is doubtful whether the course could be shortened to suit them in particular.

P.U.C. or B.Sc.?

The argument that recruitment at the B.Sc. level will enable the students to migrate to other fields in case the leather industry fails to provide them with employment opportunities is negative in its approach to the entire problem. We can leave it to the planners in the field of leather education to assess periodically the requirements of the industry and the State and control the production of technologists. It should also be left to the good sense and discretion of the students opting for this course as they may be trusted to gauge for themselves the employment potential of the industry and patronise or shun the course accordingly. The argument that the B.Sc., B.Sc. (Tech.) course is more broad-based and helps to stimulate and develop the latent talents in a student sounds more plausible and is worth looking into. On the other hand, the integrated course has been purposely designed to provide the necessary bias towards leather technological education in the formative period of the student's career so that he will turn out a specialist in his field. Much may be said on both sides but it is necessary to give the integrated course a reasonable period of trial before thinking of changing it altogether. As already pointed a higher standard of training in english may help to tilt the balance in its favour.

Duration for B.Sc.(Tech.) and B.Tech. courses

It is recognised that the duration could be conveniently fixed as six years after the matriculation or after qualifying for the S.S.L.C. Cutting down the period may not be feasible as even now difficulty has been experienced in achieving satisfactory coverage of the subjects. It is likely to be made even more difficult now that introduction of fresh scope for specialisation in the final year is envisaged. In this context, it may be pointed out that the Calcutta course provides instruction for only 4 years to the P.U.C.'s. This means that a matriculate puts in only five academic years in all at the university level before he qualifies for the degree. Whatever the intrinsic merits of the degrees, this will definitely lead and has already led to controversies and parochial exchanges. The need for maintaining the same dura-

tion for the degree course, irrespective of the individual preference is thus urgent and necessary. Considering the enormous number of subjects that have to be covered and taking in view the fresh subjects that are proposed to be included in the curriculum in order to provide new force, direction and purpose to the course, it is difficult to see how a period of less than six years after matriculation, can do adequate justice to the education of the B.Sc. (Tech.).

Modifications: Modifications in the course are, however, necessary in order to make it purposeful. As pointed earlier, teaching of english should continue upto the 2nd year and a high standard of proficiency should be ensured. The present system envisages imparting a broad-based education till the end of the 3rd year to be followed by training in leather technological subjects in the 4th and final years, and appears to be based on a sound enough concept. However, at the end of the 4th year the student should be given the choice to specialise in management, or engineering or industrial chemistry and research. The chemistry of leather manufacture which is at present taught in a rather elaborate manner can be cut down conveniently to make room for the specialised courses. The business management course will include commerce, productivity, organisation, industrial psychology, marketing and economics. The engineering branch will include a more intensive course in mechanical engineering, designing and fabrication and elements of hydraulics and electronic engineering. The research course will necessarily include working on a problem and submission of a thesis, which is now covered by the subject of 'home paper' or 'special problem'. In working for this thesis, at present the student confines himself only to the scientific or technological aspects of the problem, but does not include the economics of the process, the layout and marketing potentialities of the product. In short, this work should combine a thesis as well as a scheme, in order to make it meaningful from the industry's point of view. Besides this problem, industrial organic chemistry and polymer chemistry will be compulsory subjects taught in this branch.

Difference in perspective: Thus the student in addition to studying the usual subjects will have to opt for one of these specialised courses. These subjects will have necessarily to be introduced at the expense of others related to leather technology. Chemistry and process of leather manufacture, particularly the

former can be curtailed to the minimum and so designed that the student covers the subject more or less in the same manner as the diploma candidate with the difference that he develops a different perspective in that he has a better background in science and chemical engineering. The crux of the problem as already pointed out is that the B.Sc. (Tech.) is not trained to be merely a better technician or chemist as compared to a diploma holder, but designed to fulfil certain other needs of the industry which are far more important for shaping the industry's future.

Syllabus

There is great need for having uniform syllabi for the degree course also. Comparing those of the Madras and Calcutta courses as run in 1961, all theoretical aspects of engineering are covered at Calcutta by two papers entitled 'Elements of mechanical and electrical engineering' and 'Machineries' carrying 100 marks each. In Madras, they are covered under 9 papers, viz., 'Applied mechanics', 'General engineering', 'Electrical engineering I', 'Heat engines II', 'Electrical engineering II', 'Engineering drawing I', 'Introductory chemical engineering', 'Leather Trades drawing', and 'Leather trades engineering and drawing', carrying respectively 100, 50, 100, 100, 100, 100, 100, 70 and 70 marks each. On paper, at any rate, the Madras syllabus as far as engineering aspects are concerned is comprehensive and appears to be better designed. If, however, the value of the marks allotted to the engineering subjects in proportion to the total is taken for consideration, the Calcutta syllabus appears to have the edge over the Madras one. A similar pattern evolves if other subjects are also taken for consideration. Three subjects found in the Madras syllabus, viz., German, Advanced physical chemistry and Introductory chemical engineering do not find a place in the Calcutta syllabus. The latter appears to have effectively combined both theory and practice in imparting instruction in leather manufacture as judged by the syllabi for the leather subjects whereas the Madras syllabus lays accent on the theories which are covered by as many as five papers. It is thus clear that there is urgent need to determine what is best for the technologists and implement that syllabus on an All-India basis.

Provision for expansion

The Calcutta and Madras colleges can conveniently modify the B.Sc. (Tech.) course on the lines suggested earlier, and train

technologists for the leather industry. If the need for technologists increases, they can expand or the institutes training diplomas at present can be upgraded so that they produce the necessary technologists. The course and the syllabus should be the same for both the Calcutta and Madras degrees. As syllabus plays a much more important role in an integrated course, greater attention should be paid to its drafting which should be left to a special committee appointed for this purpose.

M.Tech. and Ph.D.

The post-graduate technology degree caters more to the academician and research worker and the extension technologist. The former anticipates or visualises problems and attempts their solution while the latter studies the problems of the industry and tackles them on the spot. The present M. Tech. course of the Madras University envisages the bifurcation and specialisation of the chemist, engineer and business expert but should also provide for the training of the extension technologist. The latter should be a combination of all the three and at the same time possess excellent understanding of human psychology. He will necessarily be a public sector man and provided with extensive and intensive inplant training. Usually he will be the link between the State and industry and may well hold the key to the future of the leather industry in our country. It is, therefore, suggested that greater attention and thought should be bestowed on drafting a suitable syllabus for this type of post-graduate training. Public relations, labour relations, human psychology should figure prominently among the subjects taught to him in addition to leather technological topics which should be his particular field of specialisation. Continuous contact with the trade is an essential feature of his inplant training but this should not be particularly difficult if he is attached to the extension division of organisations like the Central Leather Research Institute or Small Industries Service Institute which run effective extension services. In formulating the syllabus for the academician studying for M. Tech., bias may have to be given for the pure sciences or engineering keeping leather only as a field of specialisation, so that if necessary, they can look to other fields for employment or qualify for the Ph.D. in the former subjects.

Inplant training

The problems of inplant training are still more acute in the case of technologists. It is vital for the technicians as they have to get closely acquainted with the skills and crafts of the trade. For the technologist, an overall acquaintanceship with trade practices helps to develop in him the correct perspective in his future role as an executive, manager or engineer. It is not necessary to 'sandwich' this experience in between the course, as in the case of technicians. The training has necessarily to follow the course and may run conveniently for periods of 3-6 months. Here again, the State may have to intervene if necessary and arrange for the inplant training of technologists.

Foreign training

The facility for foreign training is now available only for candidates from public sector organisations. Such facilities should be extended to those from private sector organisations and also candidates at the university level. This may provide the much-needed incentive to do well in the examination, apart from the award of scholarships, prizes, etc. Employees from the private sector should be cosponsored financially by their employers as well.

Facilities

Laboratory and workshop facilities should be adequate for training technologists. Pains should be taken to create the right kind of background or atmosphere that is conducive to stimulate creative thinking. If workshop and tannery facilities are important for training of technicians they are more so for technologists as training here should be even more individualistic. Equipment to student ratio should be even smaller.

Library facilities

What has been said in the relevant context for the diploma course applies here also. If an 'abstracts' service is made available to the final year students of the B.Sc. (Tech.) course and both the 1st and 2nd year students of the M. Tech. course this will help considerably in keeping them abreast of modern developments in the subjects.

Staff

Staff requirements for training technicians at the diploma level were not dealt with at all. There is no reason why proper

staff to handle the diploma students could not be readily procured provided financially the service terms are made sufficiently attractive. The point is, well qualified staff are readily available if the authorities would only take the trouble of paying them well. It is an unfortunate fact that the teacher's lot in the training institutions is not a happy one and they are continued to be employed on grades that suffer in comparison with those offered for the private or public sector jobs. There must be rationalisation of grades on a national basis and they should be made sufficiently attractive to draw the best of talents.

Staff for technologists

The problem assumes an altogether different complexion where the teaching and training of technologists are concerned. The quality of staff is of utmost importance for the degree and post-graduate degrees courses. It may be mentioned here that there is great difficulty in securing qualified examiners in sufficient number to value the theses for M.Sc. and Ph.D. degrees in leather technology. Delay in valuing the theses has caused considerable hardship to students. This aspect of teacher-problem should also receive consideration. The teachers should really be experts in their fields and must have put in considerable periods of service either as academicians or in the industry. It is well known whatever may be said to the contrary that the ultimate determinant of the quality of the product is the efficiency of the teaching staff. Technological and scientific staff should engage themselves in research as it will not only help to keep their interests in the subject alive but help to improve their knowledge and keep it up-to-date. As a result the students are immensely benefited. Teaching also helps research in that it enables the worker to take correct stock of the accomplishments in the field and thus facilitate crystallisation of ideas. Teaching staff should always be encouraged to do research. Not all academicians can be good teachers. Hitherto the practice has been to take a qualified technologist for this purpose. It may also be necessary to make him undergo a vocational course in teaching so that he may grasp the rudiments of teacher-student partnership.

Lecturers from industry

While on the question of choosing the proper staff mention should also be made of the need for lectures

to be delivered by experts drawn from the trade. Industry does not appear to be eager to spare their technologists for this purpose. The government may find it necessary to exert their influence in this field also and persuade the industry to cooperate. The part-time lectures can be conducted in the form of group discussions or seminars. Constant touch with the trade regarding management, administrative, labour and productivity problems will help them to familiarise themselves with the industry and visualise their own roles in such a set-up.

organisation, administration and partnerships

Advisory Board

It is understood that a Central Advisory Board for education on leather is in the process of being constituted. However, representatives from the various organisations indicated in the schematic diagram 1 should find a place in the Board. There are six States conducting courses in leather technology and they may be represented on a rotational basis by one member to be chosen by the Board each year. The export promotion councils also should have a say on this subject as necessary orientation will have to be given to any plan for education in leather so that our exports will be kept up if not improved upon. The leather industry should be represented in the Board, which should meet at least once a year or more often if there is a necessity for such meetings.

Quality of training

The more urgent need is to plan the qualitative aspects of training. The first task will be to determine the scope of the rural artisan and machine operator courses run by the Khadi and Village Industries Commission, State Khadi Board and Small Industries Service Institute and the Central Leather Research Institute and other regional and State institutes. The course and syllabus should be rationalised and standardised on a national basis. The nature of the course and scope of syllabus should be left to be determined by the Central Advisory Board. Annual reports should be sent by these organisations to the Technical Education Department of the Ministry of Education and these may be consulted by the Board for further recommendations if any. The inter-relationship between the various bodies is represented schematically in diagram 2.

Need for control

In suggesting the above scheme, it is well realised that the Departments of Technical Education and other State organisations are actually under the State ministries and will take orders only from them (diag. 3). Hence the Advisory Board, which incidentally can act only in an advisory capacity has to approach them through the proper state channels via the central ministry of education. Implementation of these proposals will therefore be effected by persuasion only and cannot be obligatory and depends very much on the favourable reaction of the State ministries for education or industries. It is in this context only that the perennial question of the extent to which control and freedom should be exercised in the field of technical education is posed. It is of course true that achievement of a high standard and integrity in education requires freedom and the opportunity to exercise it. For this reason only, so much centralised control over the educational systems and curricula of the states and universities is not considered desirable. However, when it is a question of planning for technical education meant to foster an export oriented industry in a country where plan targets have to be necessarily achieved in order to improve its economy, some sort of control and direction is inevitable. For example, it is quite possible for the Advisory Board for technical education in leather to prescribe broad-based courses and syllabi which will be flexible enough to provide leeway for the individual institutions and colleges to vie with one another in producing trained personnel of a superior stamp etc. This is necessary and vital for the promotion and growth of technical education. A similar advisory role will be played by the Board in rationalising and providing direction for the courses run by the State Directorates of Technical Education.

Administration

Diagram 4 explains the administrative set up of the educational institution. The principal occupies a pivotal position whether it is a question of laying down a policy or carrying it out or the day-to-day administration of the institute and so on. Administratively speaking, he is directly responsible to the Director of Technical Education or the University as the case may be. Policy-making will however be done by the Governing Body. The constitution of a Governing Body where it is non-existent is most essential. It should consist of the principal, an educationist,

an administrator of the concerned ministry or university, a member from the industries department of the State and at least two representatives from the industry. It is useful to define the extent of representation that should be offered to the industry. It may be argued that if they are given a majority representation they will be in a position to dictate what shall be taught and how it should be taught. This is, of course, undesirable from the academic point of view. On the other hand, as potential employers of the trained personnel they have a legitimate right to exercise a stronger interest in policy-making. A compromise has to be struck and representation to an extent of at least a third of the total strength of the council should be given to them. The council should also be the appointing authorities for the teaching staff of the institution. They should, however, take care not to interfere with the day-to-day administration of the institution.

Role of the principal

The principal will be solely in charge of internal administration. In performing his duties, he should never forget that the primary aims of his office is to provide his staff and students with enough scope and opportunity for imagination and originality. He must also be in a position to feel the pulse of the students and staff by encouraging them to form associations and sharing with them the responsibilities of running the institution. The principal must be prepared to distribute responsibility and this can be done through heads of departments, lecturers and so on. This means greater freedom and responsibility for the staff. They should however take care that the governing body's policy is not frustrated and the principal does not have to face the embarrassing prospect of his major decisions made more difficult or impossible. Thus there must be a clear two-way understanding between the staff and the principal. The principal should be assisted in his task of administration by a committee drawn from the senior staff and this should include the vice-principal and the administrative officer also. In case of conflicts of opinion, the final decision must be the responsibility of the principal.

Staff and students

From the point of view of freedom the formation of staff and student associations is necessary to discuss problems and ventilate grievances, if any. Welfare of the staff should be the primary concern of the principal as the success of educational institution

depends on how much interest is shown by the head in his staff's problems and how successfully he tackles them. For the same reason, the students should be given freedom to organise and be responsible for their own activities. Freedom given to students has not always produced favourable results but, it must be realised that without freedom, growth in capacity for responsibility is impossible.

Partnerships

The success of technical education is made possible only by establishing fruitful partnerships at various levels. In the foregoing pages, broad principles have been laid in achieving partnerships between the state and education, and the internal administrative partnerships necessary for running an institution. Here, it is proposed to deal with two other types of partnerships that are vital for the successful functioning of technical education in any field of technology in a country.

Partnership among institutions

The first is of course the extent of liaison between the various institutions devoted to the cause of technical education in leather in the country. Even though the broad policy is laid down by the Central Advisory Board and to that extent rationalisation will be effected in the pattern of education, it is however necessary for the various institutions to practice close collaboration if achievement of rationalisation is going to be a reality. The heads of the institutions should be given opportunities to meet amongst themselves and compare notes at least once in a year. A more effective way of coordinating their efforts is to have a central board of examiners, members of which will be drawn from the staff of the various institutions. This board will be responsible for conducting all examinations and their results. This will not only help to promote partnership among the institutions but will go a long way in maintaining uniformity of attainments among the students trained by the several units. Another method of achieving unison in the level of instruction imparted by the various institutions is to arrange for exchange of staff between them for short periods. This will also serve to educate the staff on the regional needs of each institute. It may be mentioned that whatever may be the efforts of the Central Advisory Board to co-ordinate the efforts of the individual institutions, to achieve effec-

tive partnership, everything ultimately depends on the initiative and efforts of the institutions themselves.

Partnership with industry

The most important among the partnerships involved in technical education is without doubt the one between the industry and the institution itself. The success or failure of technical education is gauged by the industry's response to it. Diagram 5 indicates how the industry is tied up in every phase of the general scheme for technical education in leather. Industry should be given generous representation in the Central Advisory Board and the Governing Body of each institution. It should figure prominently in the institution's activities if education in leather technology is to be meaningful. The educational authorities should be prepared to let the industry tell them what is wrong with their methods of training if the latter are not satisfied with it. The institutes must be prepared to run refresher courses for men from the industry to suit the latter's convenience. They should again choose men from the industry and provide them with necessary facilities etc. for delivering a course of extension lectures to the students and staff where refresher courses are run. If necessary, the institutions should be prepared to arrange for an exchange of staff so that the industry is not put to much inconvenience by the absence of their regular staff. This will also provide an opportunity for the institute's staff to keep in touch with industrial practices. Such a partnership has actually been experimented with success by the Central Leather Research Institute, who periodically invite guest-tanners and guest-lecturers to spend short periods at the Institute.

Industry should be consulted at every opportunity possible, during the selection of candidates and also in the final examinations, when the students should be asked to take an oral test by a panel of industrialists. This will convince the men from the industry that it is not the intention of the educational authorities to nurture the students on a diet of bookish knowledge alone and that they are not afraid to let their practical knowledge be tested by a panel of hard-boiled tanners. As pointed out earlier, the institute should take pains to visit tanneries, get acquainted with their problems and make a sincere attempt to tackle them by doing research where necessary. More than anything else, this will help to establish the bonafides of the educational institution and win the confidence of the industry.

In conclusion, it should be pointed out that technical education (leather) has everything to look forward to, if it is reorganised at the national level and effective steps are taken to coordinate the activities of the various organisations related to this field. Partnership with industry occupies a special position and the key to the future of education may well depend on how assiduously it is cultivated by all educational organisations engaged in the training of personnel for the leather industry.

appendix 1

Diagram 1

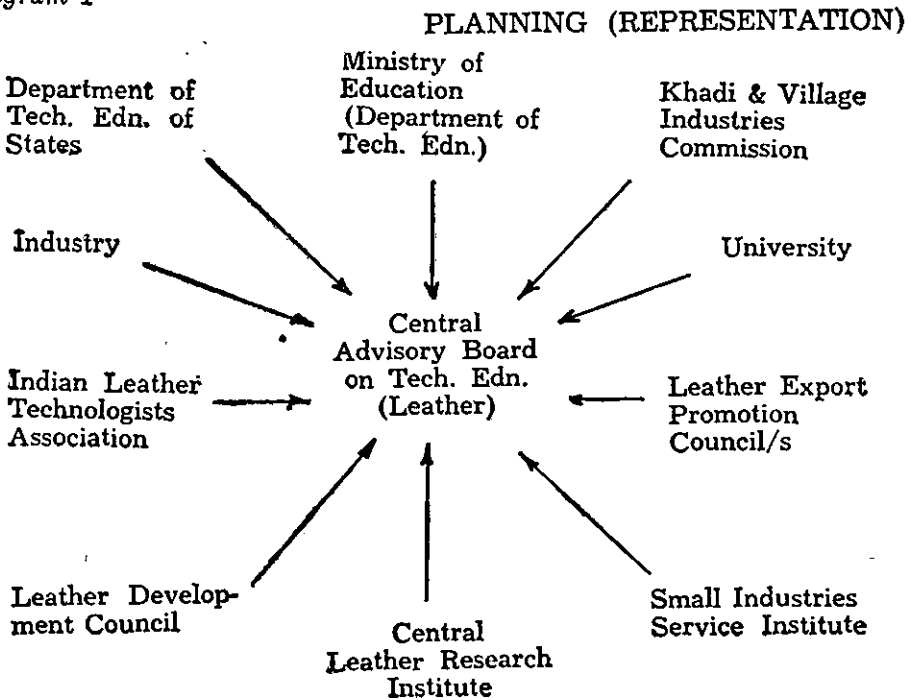


Diagram 2

ORGANISATION (RURAL AND ARTISAN COURSES)

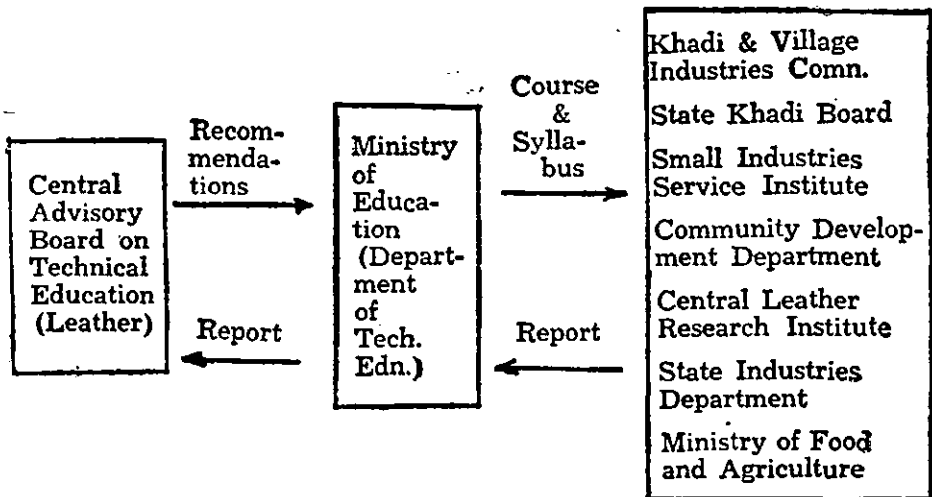


Diagram 3 ORGANISATION (DIPLOMA AND DEGREE COURSES)

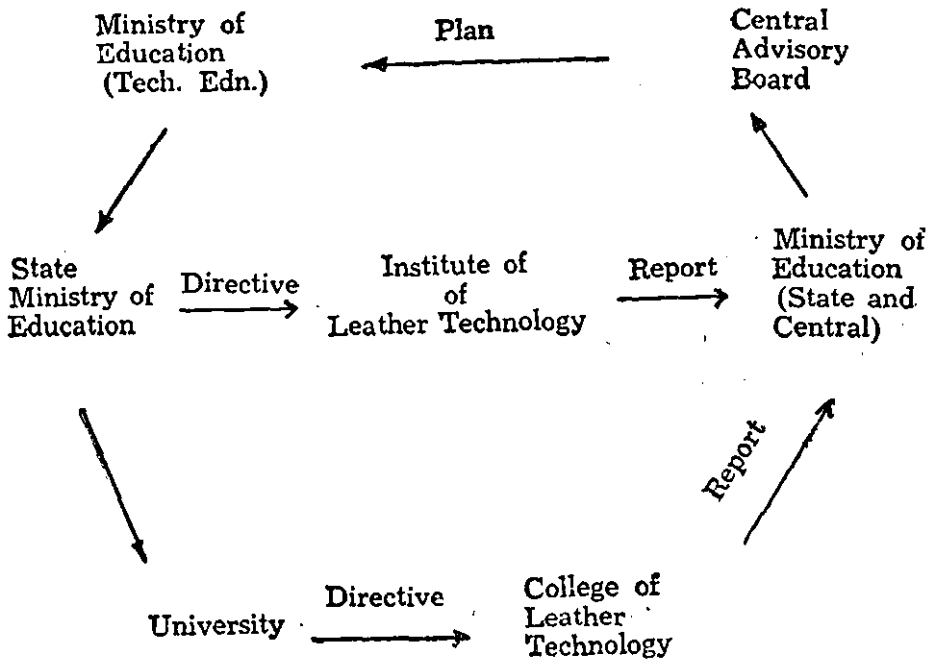


Diagram 4a ADMINISTRATION (COLLEGE OR INSTITUTE)

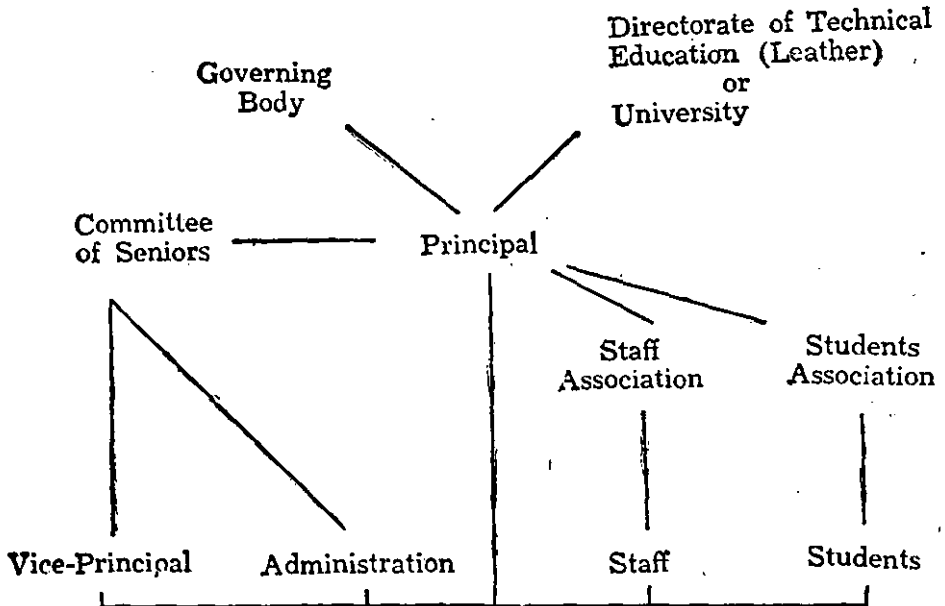


Diagram 4b

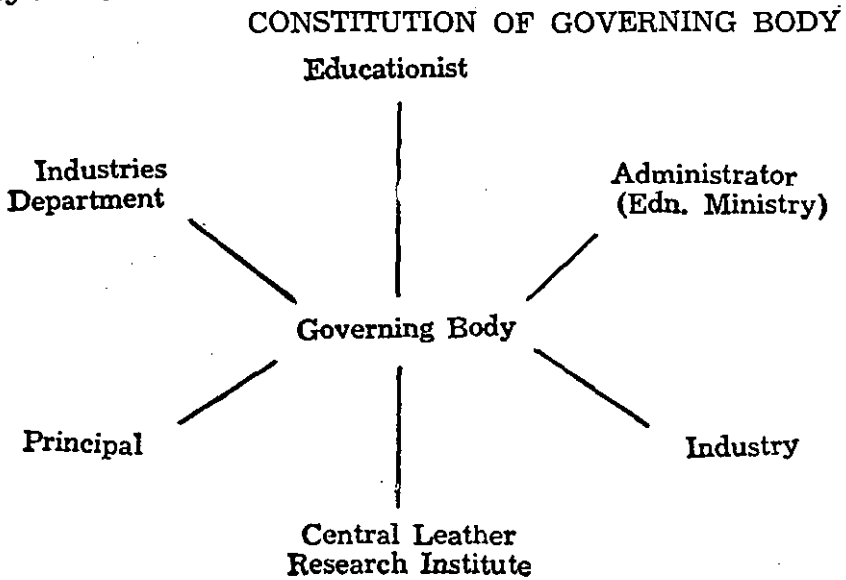
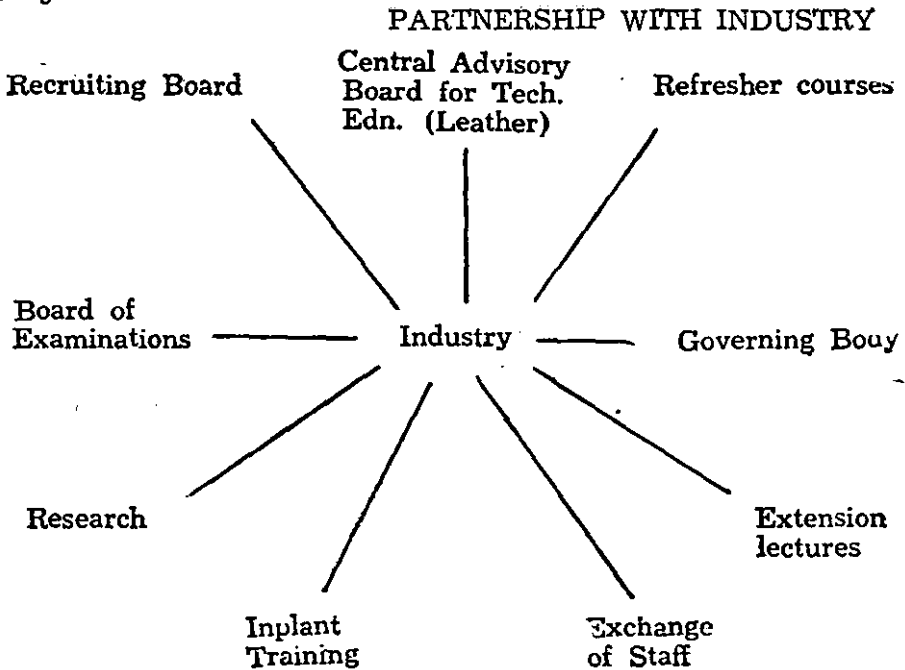


Diagram 5



discussion and conclusion*

The background note for the blueprint was taken as the basis for all discussions concerning the planning of education in the field of leather technology as it was found to cover practically most of the ideas, thoughts and suggestions put forward during the sessions of the Seminar. It is, therefore, felt that adequate justice to presentation of the problem in its entirety and indication of the possible methods of solving the many important questions that may arise in planning its future, can be best done by pinpointing the suggestions received and clarifications sought in critical appraisal of the background note and also by providing coverage to those aspects of the problem that do not already find place in the note.

A. Points raised in critical appraisal of the background note

A general criticism of the introductory part of the note is in reference to the statement that the industry is undergoing a revolution. The senior author of the note (Dr. Y. Nayudamma, Central Leather Research Institute) convincingly argued that viewed in the background of what has taken place in the industry during the last 5 or 10 years, one is quite justified in characterising these changes as revolutionary.

Shri Amitava Sen (College of Leather Technology, Calcutta) pointed out that the degree course at Calcutta was for 4 years for students at the Higher Secondary level and not for 3 years for I.Sc. students as mentioned in the background note. This was so amended. His other amendment was that the Central Advisory Committee for Education in Leather can only act in an advisory capacity and cannot be made responsible for prescribing curricula, syllabi etc. was also accepted.

Shri J. C. Sen (Government Leather Institute, Kanpur) felt that the duration of the diploma course should not be for more

* Summary of conclusions arrived at during Seminar on Technical Education (Leather) held on January 30 & 31, 1964 at the Central Leather Research Institute, Madras.

than two years, as a longer period may result in wastage of time and talents. It is, however, doubtful whether a duration for two years will do adequate justice to the increased number of subjects proposed to be included in the revised syllabus to provide accent on engineering, commerce and management. This assumes even greater importance if one considers it necessary to align the degree and diploma courses so that diploma holders might be given a chance to qualify for the degree. It is also well recognised that there is need to pull up the standard of the diploma courses.

Another point made by the same speaker was that recruitment should be made on merit alone. However, the usefulness of subjecting them to a personality test as well as giving preference to the student coming from the industry was brought out by Dr. Nayudamma.

Running of 'sandwich' courses and establishment of a Central Board of Examiners for the diploma students were also held to be administratively very difficult to achieve in practice (Shri J. C. Sen). This has already been pointed in the background note but where a tanner is prepared to co-operate, the sandwich course should be given a serious trial, conveniently sandwiching the practical training in the summer. Similarly even if the formation of the Examining Board is not possible officially, it should be practicable for the several regional institutions to have an exchange of examiners.

Among other difficulties expressed by Shri Sen, was the lack of scope for research in the teaching institutions owing to tightly-packed lecture-schedules. Such a facility should be provided to nurture the student in a stimulating and inspiring atmosphere and the teacher to keep abreast of the developments in his field. He also mentioned that in spite of good representation being given to tanners in the institution's Advisory Council, there is still difficulty in getting enough number of industry sponsored candidates and lack of facilities for inplant training. These points only serve to emphasize the need for doing research on the tanner's regional problems in order to win their cooperation and confidence.

Shri Jadhav (S.I.S.I., Cuttack) made the very useful point that each institute should have a well-organised extension service unit. The staff, the time and money should be made available for this purpose.

Shri A. R. Swaminathan (Bihar State Small Industries Corporation, Patna) felt that the rural courses run by the various organisations like the Khadi and Village Industries Commission need not be taken into consideration while planning the future of education in leather. As already mentioned in the background note, as the raw materials, viz., hides and skins come mainly from rural areas, education for the rural sector is equally important and needs a certain degree of rationalisation as does the training of personnel for the small scale and organised sectors also. He also made out that the note should contain details of the subjects and syllabi for the various courses, adding that leather goods and footwear should also find place as subjects in the curriculum since the students will have the advantage of a knowledge of the end-use of the various types of leathers they have learnt to make. A similar thought was also expressed by Shri J. C. Sen. It should be mentioned as it has already been pointed out in the note, that such important details should be worked out by a much smaller expert committee and not certainly by a large body as was present for the seminar engaged as they were in deliberating over the broader issues and policies within the short duration of 1½ days.

The same speaker observed that inplant training should be given to students both in the organised and small scale sector units. Viewed in the context of the difficulties expressed both by Shri J. C. Sen (Govt. Leather Institute, Kanpur) and Shri Roy Choudhury (Govt. Leather Institute, Agra) in providing inplant training facilities for the students and later by Dr. Nayudamma and others, it is difficult to visualise how such a comprehensive scheme of practical training can be made workable. In the same breath, Shri Swaminathan opined that no pressure should be brought to bear on the industry in taking students for training by way of provision of incentives etc. Dr. Nayudamma, in his final summing up, touching on this point, expressed the views that there was fundamentally nothing wrong in thinking of legislative and other measures if they were going to be of benefit to the industry and the country ultimately.

B. Points made out during the discussion but were not covered in the background note

Shri S. Kulasekharan (C.L.R.I., Madras) presented a completely new scheme of diploma and degree courses with other details such as duration, subjects etc. in place of the existing system.

His ideas appeared to express the thinking of a student who had been oppressed and obsessed with a plethora of subjects that carried no potential value for industrial application. As a result, he advocates intensive training in a few subjects and alignment of diploma and degree courses, thus striking a rather reactionary note in these days when a broad-based technological education seems to have universal appeal. His views deserve attention if only as a study of the unhealthy and bitter reaction produced in a technologist by a short-sighted, unsympathetic and unresponsive industry. An equally revolutionary suggestion came from Shri S. Raja ('Tanner', Bombay) that the country should have only two national Institutes to train personnel of quality. This is no doubt a good idea, but he did not elaborate on how far this is practicable considering that we have already in existence seven institutes and two colleges.

Regarding the quantitative aspect of planning the number of trained personnel required during the next five year period, Shri M. Banerjee (College of Leather Technology, Calcutta) wanted the Planning Commission to fix the target for trained personnel in consultation with all the organisations connected with the training of personnel for the leather industry. This means that a proper assessment will have to be made of the requirements for trained personnel during this period. An attempt has been made by the Central Leather Research Institute in this direction (appendix 3) but further efforts are needed.

Dr. Selvarangan's (C.L.R.I., Madras) suggestion that the estimate should be based on the quantity of available hides and skins for processing has also been considered, though his estimated figures are on the optimistic side. He also suggested that the teaching institutes should be run partly as production centres. As pointed out by Dr. Nayudamma, the wisdom of this proposal is questionable in view of our past experience in the running of such training-cum-production centres. In this context, a somewhat novel suggestion put forth by Dr. P. H. Rao (Bata Shoe Pvt. Ltd., Batanagar) was that regional public sector tanneries should be established if only to absorb the trained personnel produced by the various institutes. As pointed out by Dr. Y. Nayudamma, this measure will be fraught with grave consequences and will help only to smother what little initiative that has been shown by the private sector industry. It is almost tantamount to suggesting nationalisation of the industry!

Much time and thought were devoted to the question of providing facilities for the diploma student to qualify himself further and an interesting suggestion mooted by Prof. Madhavan Nair (A. C. College of Technology, Madras) was that the Central Leather Research Institute should run a correspondence course for a higher diploma to meet their specific needs. This was also proposed independently by Shri A. G. Deshkar (Gwalior Leather Factory, Morar, Gwalior). Referring to the point in the final summary, Dr. Nayudamma remarked that while the Central Leather Research Institute would certainly like to help as much as possible in training of personnel at various levels, the practical implications of this proposal will have to be looked into more carefully.

Another interesting suggestion made by Shri C. Koteswara Rao (C.L.R.I., Madras) was that whether the courses for textile and leather technologists could not be amalgamated in order to provide greater employment opportunities for the qualified graduates. A similar thought was expressed by Shri Seshaganapathi Rao (C.L.R.I., Madras) who suggested that chemical engineers might be given a special course in leather by C.L.R.I. after their graduation; where the target is to produce a tannery engineer, it is better to train a mechanical engineer in leather rather than vice versa to achieve best results. He also stressed the need for devoting greater number of hours for workshop practice in the existing curriculum. The force behind the argument is that the leather technologist will thereby have wider scope for employment.

A much commended idea proposed by Shri V. V. Deshpande (Directorate of Industries, Bombay) was that all technicians and technologists should compulsorily be made to work in rural areas. This will help to educate them in the problems of the rural industry and also provide the latter with the much-needed technical know-how.

Dr. H. P. Chakravorty (Govt. Leather Technological Institute, Morar, Gwalior) made the interesting suggestion that tanning should be taught as a craft to school-students at the lower secondary level. This should perhaps go with the subject of leather-working and will help to make the children more leather-conscious. It will also provide the underprivileged in the social milieu an opportunity to qualify themselves educationally.

Dr. Nayudamma pointed out the need for running special courses in leather for inspectors from the Defence and Customs Departments, Export and Import Agencies as judged from the number of problems referred to C.L.R.I. for expert opinion in cases of arbitration, etc. Such short-term courses will provide these personnel with the necessary background information to make correct, fair, on-the-spot appraisal which will save a lot of time and money spent on correspondence, consultation of expert opinion, etc.

A number of delegates (Sarvashri M. Banerjee, Roy Choudhury, J. C. Sen and others) felt that the education imparted to leather-goods and footwear trainees also should have been taken up for discussion at the seminar. Actually an attempt was made to cover these two subjects also (vide Appendices 4 & 5: Notes by Shri N. R. Lodh, Central Footwear Training Centre, Madras and Shri M. K. Bhagvat, Modern Tanners Cooperative Society, Dharravi, Bombay) but the Central Leather Research Institute could not take upon itself to prepare an exhaustive background note as done in the case of leather, since the institute is not directly concerned with education in these fields and therefore cannot be expected to speak with authority on these subjects. Perhaps the Advisory Sub-Committee which has already been formed as assured by Shri A. K. Mandal (Department of Science, Ministry of Education) can take up this subject for formal discussion after inviting notes from authorities in these particular fields.

Finally it is well worth mentioning as pointed out by Prof. Baldev Singh (Directorate of Industries, Punjab) and many others that changes in the educational system should be made only after careful deliberation, exhaustive analysis and consultation among all the organisations involved. The blueprint note and the appendices are presented as evolved after a searching critical appraisal in the seminar in which practically all those interested in the field took a keen and active part. It is therefore sincerely hoped that this note with its appendices will provide really useful guidance for the deliberations of the Central Advisory Committee for education in leather.

current views on technical education (leather)*

To ascertain the views of the various parties interested in the question of technical education (leather), questionnaires of three different categories were addressed to the employers (private and public sector), educational institutions and qualified technologists. Out of a total of 500 questionnaires distributed, 146 only were returned duly filled in. The break up of this figure is as follows: 37, 6 and 103 in the above mentioned three categories respectively. Out of 103 questionnaires received from qualified leather technologists, 51 were from degree and post-graduate degree holders and 52 from diploma holders. While 58 persons have expressed their satisfaction over the training given to them 45 are not satisfied, this being mainly attributed to lack of practical training. Obviously, the number of replies received do not warrant specific conclusions being drawn except in cases where a distinct trend by way of a very large majority expressing their preference was observed. The following are the points that could be stated starting on this basis.

The employers showed an awareness of the need for greater number of technical personnel of both diploma and degree holders in the next five years. The ratio of the two could be roughly computed as 1 : 1. No positive indication could be obtained about the defects in the present system of training imparted. However it may be stated that there is an indication of the need for better practical training to be given to the students. Several of the answers received revealed readiness on the part of the employers to provide inplant training facilities. This fact is echoed by almost all the technologists also for they feel there is scope for improvement in the practical training that they receive.

As employers many tanners prefer diploma holders for the latter are economical to employ and make up for any possible lack of efficiency by their hard work.

* An analysis of the data collected through the questionnaires sent by Central Leather Research Institute in October 1963.

The leather technologists (degree & diploma holders) are not very enthusiastic about the reception they get from the industry, each category feeling that the other is favoured. The chances of employment are felt to be better in the public sector than in the private sector and also in the research institutes. An almost unanimous feeling was that the Government should exercise their influence in obtaining greater employment opportunities for degree and diploma holders.

The industry recommends an initial salary of Rs. 150/- to Rs. 250/- for the diploma holders and Rs. 250/- to 350/- for the degree holders. This remuneration corresponds to the reasonable claim put forward by the leather technologists.

A general desire for suitable modifications in the syllabus of training is voiced by 90% of the replies received. Tanners and leather technologists strongly advocate that the courses in various institutes should be uniform with provision for more practical work. Educational institutions also express their full agreement on this point. 2/3rds of the responders are in favour of enlargement of course by including subjects like polymer-science and leather technology. An extreme extension of this idea has been the suggestion to rename the leather technology course as "Rubber and Polymer Technology" or "Chemical Technology". The need for the introduction of subjects like management principles and practices, ideas of productivity and economics is also sufficiently appreciated both by leather technologists as well as educational institutions. 60% of the replies received are for continuance of the engineering subjects in the syllabus.

Educational institutions hold that new courses (particularly specialisation in certain branches of leather manufacture) rather than new institutions constitute the need of the hour. They also feel that diploma holders should be given facilities for qualifying themselves as graduates. There is, however, no accord on the level at which they should be admitted for the degree courses.

A variation is noticeable in the strength of staff and the scale of salary of teaching staff employed in various regional institutes. Besides, no uniformity is observed among these institutes in the allocation of number of hours per week for various subjects, viz., theory, laboratory practice, works practice etc.

Regarding library facilities, there is great disparity in the number of technical books stocked by each institute, the maximum and

minimum number being 2870 and 279 respectively. The same condition exists in case of the journals also. It is thus apparent that there is a need for setting apart a fixed minimum amount of money in every institute for purchase of books and journals which helps students as well as the staff to keep abreast of modern developments in leather and allied subjects.

An unanimous opinion is that text-books on leather science and technology dealing with Indian conditions and techniques, for different standards should be brought out to cater to the needs of the students in particular and the industry in general.

The data received from the educational institutions (except Govt. Tanning Institute, Bombay) reveal that 243 diploma holders and 81 degree holders have passed out during the period 1958-63. The total number of graduates that have been turned out so far from A.C. College of Technology, Madras and College of Leather Technology, Calcutta is 92 and 52 respectively. Figures regarding their placement are however incomplete.

While the survey conducted has yielded useful information regarding employment in the public sector organisations, more data regarding placement of personnel in private industry are necessary before the survey could be taken to be sufficiently representative to form the basis of a plan. Thus the analysis of the questionnaires has clearly indicated the need for a more systematic survey on the number of trained personnel absorbed by the private and public sectors hitherto and the details on the other related subjects. Hence the quantitative aspect of planning has necessarily to be shelved till the necessary data are collected. The survey may be undertaken by the Central Leather Research Institute.

Another approach to this problem will be to work out the existing ratio between the number of hides and skins processed and the number of technicians and technologists employed and hazard a forecast regarding future requirements of personnel on the basis of our plans for expansion of the industry in the next ten years. A compromise may perhaps be struck between both the methods and thus it is possible to arrive at a working formula that may give a reasonable idea of our future requirements.

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training of personnel for the footwear industry

The footwear industry in our country is presently passing through a stage of rapid change and development. The craft in the industry is gradually being replaced by the skill of engineers, chemists and other scientists. To meet the requirements of the industry, suitable training facilities should be made available to the personnel who seek employment or who wish to develop the industry. The aims of training should be to turn out personnel, who have got suitable and up-to-date knowledge of the industry and its requirements. The training also should be such that trainees always keep their minds open and receptive to new ideas and developments so that they can accept, adopt and introduce modern techniques immediately. As already explained, this industry is undergoing a very rapid change.

So far, our industry has been dominated mostly by the craftsmen. The facilities now available for training personnel for our industry do not take into account the probable requirements of the industry in the near future. Though the industry has been run on unscientific lines hitherto, it is now undergoing rapid mechanisation. This will mean that the old type craftsmen can no longer adequately man the industry which will require the services of skilled engineers and technologists. Hence there is need for rethinking on the subject of training of personnel for the footwear industry also. Though necessary funds have been made available for education in this field, it is found that there is a lot of disparity in the standard of education and training given in various institutions situated in the different parts of the country. It is painful to say that certain institutions, although known as institutions, do not even have the necessary equipments and personnel for proper training. With the rapid changes taking place in the industry, it is needless to point out that within a few years an entirely new set of persons would be needed and as such

the training imparted by the existing institutions would be of no value to the industry.

Technical education imparted has to be such that it would inspire the trainees with confidence to earn their livelihood or show them the way to do their job. But this being a long process, it has to be acquired gradually by a continuous process of training at different levels. For instance, for a vocation like ours, a training has to begin from the school level to diploma level and from diploma level to degree and post-degree level, i.e., from the basic fundamentals to industrial skill and experience and from there to industrial economics and research. This can be achieved at all State levels quite uniformly, provided all the institutions engaged in imparting training at different levels are brought under control of one Apex Body or Board which will advise on planning and policy making.

Considerable disparity exists in the syllabus and curriculum of courses run by the various state institutions though they are engaged in imparting training of personnel at one and the same level. This is because of lack of understanding about the requirements of the industry and the country. There is no uniformity in syllabus and even in many cases theoretical and practical aspects of training are not harmoniously integrated. This has resulted in great confusion and wrong approach to the problem of technical education in this field. Hence a sound policy on technical education with specific reference to our trade has to be drawn by a central controlling and guiding body. This Central Board has to formulate schemes for uniform training throughout the country at different levels with uniform syllabus and curriculum. This Apex Body has to be responsible for investigating, surveying, assessing and ascertaining the requirements of the trade and country and guide the institution at the State level. A system of technical education which does not ensure a vocation after completion of training is of no use however nice it may be from other aspects. Gradually at the middle and higher levels training has to be given on the basis of specialisation with the use of science at all levels.

It is, therefore, suggested that a special body under the National Technical Education Board be formed to formulate a central policy of technical education in leather and footwear trade and then to ascertain the exact requirements, draft a plan, and

process it at different levels. After finalising this, a special committee composed of all principals and experts from the trade and representatives from other allied organisations may be formed by the State institutions and this committee will carry out the plan. This has to be done taking into consideration the resources, staff and the existing standard of education so that it would be a practical one.

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training in the field of leather goods manufacture

Manufacture of leather goods as practised in India can be classified in the following categories: (a) travel goods such as suit cases, hold-alls, various types of attache cases and bags, trunks etc; (b) purses, wallets, brief cases, document cases etc; (c) ladies' hand bags; (d) army and police equipment such as straps of various types, pouches, slings etc; (e) industrial goods, washers, ram and U rings, packings, dust shields, pickers, buffers, gloves, belting and laces, bellows, water buckets, mashaks etc.

At present there are various schools where a certificate course is conducted to teach the artisans. There are very few diploma courses where students are taught other aspects of the industry so as to fit them for supervisory posts. This is done to a good extent in footwear courses. As there are very few organised units producing these articles it is very difficult to give any factory type training to the students. Mostly the production is carried on by individual craftsmen in their own homes. The duration of training for one year is too short for the number of articles, the fabrication of which is covered in the present training courses. It will be better to restrict the number of articles to be made and give intensive training, in a few items selected by the individual students. For example if the student wants to specialize in purses it is no use if he spends his time on hold-alls. The present standard of attainment by students is not very satisfactory mainly because of lack of intensive work.

All the leather working classes should have a small production centre attached to them where students should be encouraged to undertake production with full responsibility regarding the cost of manufacture etc. Some idea of marketing their own production should also be included so that the students will have the opportunity of learning the business aspects of the trade.

After the course is completed, follow-up work is very essential and there should always be some type of organization that

will try and solve the problems facing these students. They can be helped by providing information on newer techniques or patterns and designs, or kept well informed about changes in fashions etc. Leather goods for export should receive proper emphasis in any course by the teaching institutions.

Refresher courses for the passed students or short term courses for the craftsmen from the industry are very essential. Instead of all the States trying to have their own organisations it will be better to have one central organisation for this purpose. It is a waste of time and money for the individual States to conduct such courses. As a matter of fact even the whole training programme could be geared to one central institute. It will help to make education more economical and maintain uniform standards.

There should be some arrangements for the teachers also to attend refresher courses and learn new production methods in factories etc. An up-to-date museum of samples must be maintained, and work on new designs and patterns conducted.

Leather clothing even though not a very big item from the local sales point of view should be developed for export markets and this will mean a very different type of course. It may be possible to have this combined with some tailoring school. As the scope for mechanization of the industry is limited, special care will have to be taken in training individual artisans.

The idea of imparting training free of cost is all right but scholarships to students from artisan class should be limited to a deserving few. The government should not pay stipend to all of them to learn a trade irrespective of talents or ability. The students should be made to pay their expenses by undertaking productive work of some sort or other. Those who are keen on learning must be given all the facilities but undeserving ones should not block the way.

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<p>CHAKRAVORTY H P Govt. Leather Technological Institute Morar, Gwalior, M P</p>	<p>Role of technical education in leather industry</p>
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<p>JADHAV S H Small Industries Service Institute Cuttack 2, Orissa</p>	<p>Ways and means to solve the problems connected with technical education and the need of the in- dustry</p>
<p>KRISHNAN D R Leiner-Knit Gelatine Co Ltd Wright Town, Jabalpur, M P</p>	<p>An approach to better tech- nical education (leather)</p>
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