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Ad-Hoc Meeting of In-Plant Group
Training Directors

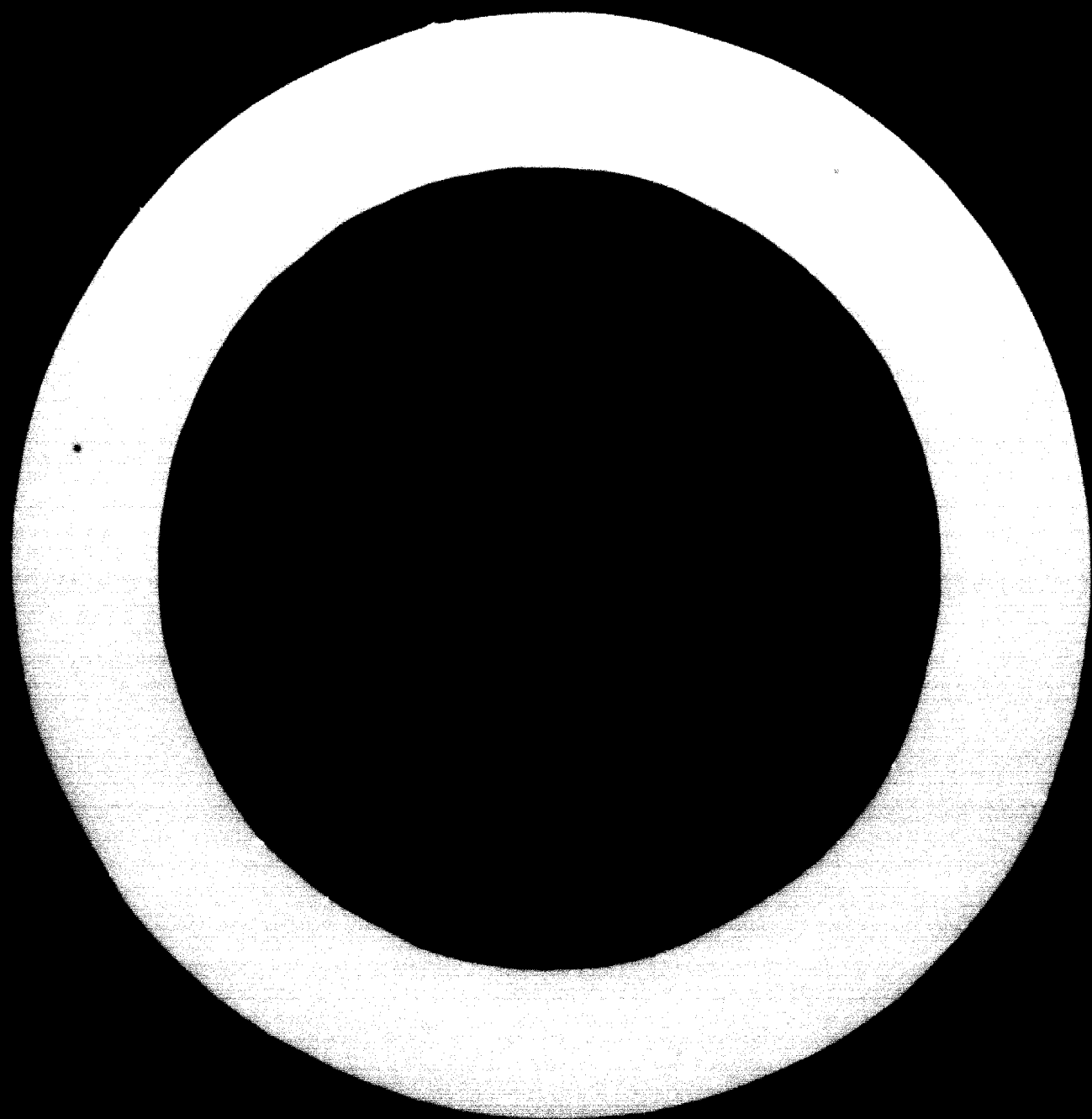
Vienna, 13 - 17 November 1967

FINAL REPORT OF THE AD-HOC MEETING
OF IN-PLANT GROUP TRAINING DIRECTORS
VIENNA, 13 - 17 NOVEMBER 1967

prepared by

the Secretariat of UNIDO

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I. ORGANIZATION

1. The Ad-Hoc Meeting of In-Plant Training Directors organized by UNIDO, held in Vienna on 12-17 November 1971. The Ad-Hoc Meeting was attended by seven directors of fifteen of future in-plant training programmes organized by UNIDO in co-operation with various industrialized countries in Europe, by a few expert consultants and staff of UNIDO, and by a representative of the ILO and observers from the Swedish and Austrian Governments.

2. Eleven discussion papers, prepared by the expert consultants, the training directors and UNIDO, were presented to the Ad-Hoc Meeting.

3. The first session of the Ad-Hoc Meeting, was presided over by Mr. Robert L. Oshins, Director, Division of Industrial Services and Institutions, UNIDO. Mr. Oshins, after having greeted the participants on behalf of UNIDO, described the main purpose of the meeting and expressed the hope that the Ad-Hoc Meeting would be able to formulate suggestions and recommendations for further work in the field of in-plant training.

4. The procedure in discussing the various items on the work programme of the Ad-Hoc Meeting consisted of the presentation of the subjects under each item by one or two expert consultants, and/or training directors and UNIDO staff. This initiated the round table discussions of a given item.

II. INTRODUCTION

5. The organization of specific types of training to be given to graduate engineers from the developing countries has been a subject of interest to the industrialized countries as well as to international organisations such as UNIDO for some time. It is felt that, especially in

the developing countries, there is a gap between the actual knowledge and skills required by industry and the supply of such skills acquired by the engineers through the existing educational systems.

6. It is being increasingly recognized in many industrial enterprises in the developing countries, as well as in the industrialized countries, that the bridging of the industrial skills gap should not be left to chance. In other words, it does not suffice to attach the graduate as an apprentice to experienced technical personnel of the industrial enterprise in question and hope that he will obtain the required skills in a reasonable period of time. There is a need to provide a systematic and closely supervised short term training to the engineers and technicians in applying the basic scientific principles to the many practical problems arising daily in the factory. In-plant training is a proven method of helping engineers and technicians to bridge the industrial skills gap in the shortest time possible.

7. A factor bearing on the degree of in-plant training required is the extent to which practical technological education has been provided to the young engineer during his stay at the university. There is growing recognition in many countries that theoretical training should be combined with the practical during the under-graduate years, and in leading schools of engineering, industrial practice has been made part of the curriculum along with the theoretical instruction. The main objective of such practical work appears to be to acquaint the student with the working conditions and atmosphere of industrial establishments and to give him the opportunity of observing the application in practice of engineering theory. While the value of these periods is generally recognized by industry, universities and the students themselves, a major drawback is that they usually confine the student to observation and do not, as a rule, let him play an active role, however modest it may be. As a matter of contrast, in-plant training programmes emphasize the development of abilities; that is, the acquisition of skills and the exercise of judgement in concrete practical cases rather than the addition to technical knowledge.

5. Organization of group in-plant training programmes for engineers from developing countries in the industrialized countries has now become a permanent feature of UNIDO's operations. Over two hundred fifty engineers and technicians from the developing countries have so far benefited from these programmes. The UNIDO is organizing the in-plant training programmes with the co-operation of several industrialized countries. The industrialized countries are providing accommodations, physical training facilities and well-qualified staff, thus sharing the total cost of the training with the UNIDO. The participating developing countries are contributing to the training programmes by paying the local salaries of their own trainees during the training course and UNIDO is providing for round-trip transportation. While a general sense of satisfaction about the in-plant training programmes exists, and these have met with the enthusiastic response from the developing countries, it is appropriate at this time to take stock, so to speak, of these programmes.

9. Based on an evaluation of the performance of past in-plant training programmes, organized by UNIDO as well as other similar training programmes, there is the need to provide guide-lines for more effectively organizing future programmes in the industrialized countries. Secondly, there is the need to formulate ways and means of adapting the in-plant training programmes for implementation in the developing countries themselves. Thirdly, general guidelines for orientating the future work programme of UNIDO in the field of in-plant training of engineers and technicians need to be outlined. These questions and tasks were the concern of the Ad-Hoc Meeting of the Group In-plant Training Directors.

III. METHODS OF IN-PLANT TRAINING

10. The Ad-Hoc Meeting, at the outset, realized that it was confronted with a difficult task. There is, on the one hand, little if any background material on methodology of in-plant training to assist

in the design of suitable short-term programmes for engineers from the developing countries. On the other hand, there is very little experience in conducting such training programmes, either on a bilateral or multilateral basis. Moreover, such experiences as do exist have not as yet been the subject of comparative analytical studies with the view to assessing the advantages and disadvantages of one or another type of in-plant programme.

11. Nevertheless, it is generally agreed that in-plant training of engineers, to be effective, should consist of a number of inter-related activities aimed at stimulating to the maximum the trainee's commitment and sense of responsibility. Experience derived from the in-plant training programmes so far conducted, has shown that to obtain these conditions in a training programme, of a relatively short duration involves a number of requirements, such as provision of:

- (a) specific, meaningful and practical job assignments
- (b) individualized tutelage
- (c) appropriate incentives
- (d) top management participation and support.

The Ad-hoc Meeting took these requirements into account in proposing the suggestions and recommendations outlined in the following sections of the present Report:

IV. SUGGESTIONS REGARDING PROGRAMME STRUCTURE OF IN-PLANT TRAINING

12. It is suggested that in-plant training programmes be organized on an industry branchwise basis. It is recognized that a number of programmes are already under way on this basis and should be continued (group A). Moreover, there are other similar programmes which are in an advanced stage of planning and programming (group B). However, a number of new industry branches are suggested for in-plant training in view of the industrial needs of developing countries (group C). On the one hand, it should be noted that important needs exist in developing countries for in-plant training of engineers in heavy industry. On the other hand, the utilization of natural and agricultural resources, e.g. through food processing and other light industries, is important to the

the industrialization of these countries and should, therefore, also be given attention in organizing future in-plant training programmes.

13. Group A. The programmes falling under Group A consist of textiles in Poland, textile machines in Italy, iron and steel in USSR and Italy, non-ferrous metals in Yugoslavia, and electrical equipment in Sweden. The experience of these programmes show that it is most advantageous to have the programmes on a continuous basis and the Ad-hoc Meeting of Directors recommends that the future programmes be organized on such a continuous basis, if possible.

14. Group B. The programmed courses are cement in Denmark, oil engines in Czechoslovakia, telecommunications in Sweden, telephone equipment in Italy, and machine tools in USSR. The former two programmes are being conducted in 1968 and negotiations are under way to organize the others in 1969.

15. Group C. For further expansion of the in-plant training programmes, other courses may relate to food processing, leather and tanning, wood-working, pulp and paper, fertilizer, transport equipment and mining. Other industry branches may be recommended by the Industrial Development Board and the United Nations Regional Economic Commissions.

16. Within each of the industry-branch training programmes three levels of courses are suggested: (I) Basic, (II) Intermediate and (III) Advanced. The detailed programme structure and duration of each of these programmes will, of course, need to be determined after careful analysis of needs and possibilities. The following, however, is suggested as a general indication of possible orientation and general frame of reference for the three levels of courses.

17. Basic courses: The duration of the basic courses which are meant for fresh engineers having about sixteen years previous education, of which three to five years in engineering, chemistry or physics, will depend on the special technical know-how needs of the industry branch concerned. Experience regarding training courses conducted in industrially advanced countries and of various basic courses instituted in the developing

countries themselves, indicates that the duration of these basic courses may vary between 100 and 500 working days. The subject content and the practical training are aimed at providing general orientation and practical involvement in the main group of functions which are performed by industrial technical personnel, such as research design, technical staff functions, production management functions and various semi-technical functions, such as sales engineering, industrial training, personnel relations etc. A second objective to be aimed at in the design of basic courses is to impart practical competence in one or more of the above mentioned specific functions. A final objective of the basic courses should be to improve the trainee's ability to absorb more advanced in-plant training abroad.

18. Intermediate courses: The in-plant training programmes which are being organized by UNIDO, are meant for engineers who have obtained general experience of several years in industry. The training programme may in the first place be designed to upgrade professional capabilities in a specific function. Secondly, intermediate courses may be orientated towards retraining of intermediate level engineers for other functions. For instance, retraining of a research engineer towards practical design work, or training of a design engineer for a semi-technical function. See the following section for detailed suggestions regarding the organization of intermediate in-plant training programmes.

19. Advanced courses: These courses are meant for persons between 35 and 45 years of age and may be relatively short in duration, for instance 20 to 30 working days. The basic aim of the training programme is two-fold: (a) advanced specialized orientation in a technical staff function, such as research, design or process development; (b) practical orientation on the management and co-ordination of the various technical functions and also co-ordination between technical and non-technical functions in industry.

20. Basic training courses should, as far as feasible, be undertaken on a national basis or regional basis. The latter can be appropriate for very small countries, or countries which have not yet established a sufficient industrial base to conduct adequate industrial in-plant training programmes. Intermediate courses may appropriately be organized on a regional and interregional basis, as, in general, a higher degree of advanced technology will need to be incorporated in the programmes. Advanced training courses in particular should also be organized on an interregional basis, since in such training programmes it is important to expose the trainees to the effect of possible environmental situations towards which they have to guide industry in their own countries. The Ad-hoc Meeting hopes that UNIDO will, on the basis of these suggestions, work out a detailed plan of action by which it can, with the support of the appropriate international and national sources, bring such an integrated international programme of in-plant training schemes into effect.

**V. SUGGESTIONS REGARDING
ORGANIZATION OF INTERMEDIATE
IN-PLANT TRAINING PROGRAMMES**

Duration

21. The duration of these programmes should normally range between two and six months. However, flexibility for programmes of a longer duration should be maintained.

Selection Criteria

22. The Ad-hoc Meeting, while recognizing the administrative and other difficulties of establishing and maintaining selection criteria, feels that efforts should be made to maintain the highest possible standards in candidate selection. To this end, the following suggestions are proposed:

1. Adequate engineering and technological education and some practical production experience in relevant lines should be prerequisites for participation in the in-plant training programmes. Moreover, proficiency in the language of instruction adopted by the host country is considered important;
2. To screen the candidates for the above requirements, the following steps are suggested:
 - (a) There are certain difficulties in relying upon certificates as evidence of education, practical experience, language of other qualifications. Recognition could also be given, therefore, to performance of candidates in in-country training programmes, used as a pre-screening device;
 - (b) Where no in-country training programme has been held, verification of the participant's experience and background could be carried out by the regional office of UNIDO, or other related international agencies, in consultation with local authorities to the extent practical;
 - (c) Other pre-screening, including tests and personal interviews by UNIDO, or its designates, could be considered;
 - (d) The possible use of pre-planned curricula could be considered to help establish selection criteria;
 - (e) The selection procedure should be undertaken in co-operation with the organization providing the in-plant training.

Training in Techno-managerial Subjects

23. Production processes do not exist in a vacuum, they are rather a part of a chain. Consideration should, therefore, be given to improving the trainee's knowledge of certain techno-managerial subjects which can make a substantial impact on the productivity of the process or function he will perform. These may, perhaps, be better taught on a local basis before the trainee undertakes training abroad. In-plant training abroad should be resorted to only after all possibilities in the developing countries have been exhausted.

Long-range In-plant Training Plan

24. The Ad-hoc Meeting suggests that UNIDO embark upon a long-range (five year minimum) programme of in-plant training in the industrialized countries, integrating it with the suggested basic in-country programmes, described in the previous section of this report. It is the responsibility of UNIDO to select those areas of industry which will be of most value to the developing countries.

Size of Training Groups

25. The size of the group should be primarily determined by the nature of the subject on which in-plant training is to be conducted and facilities available to the organizer of the training. In determining the size of the group, the tutorial requirements and individual guidance to be provided to the trainees should also be kept in mind.

Programme Design and Execution

26. The Ad-hoc Meeting assumes that the host organization will possess the requisite staff, knowledge, facilities, skills, resources and other experience essential to the design and successful execution of the training. UNIDO's role should be to ensure that the organization, selected for imparting the in-plant training, has the basic facilities which would ensure the proper assimilation of knowledge, particularly the practical aspects, by the trainees in a systematic manner. UNIDO should also become a repository of knowledge concerning such training programmes. Another major objective in the integrated approach to in-plant training should be to assure, to the fullest extent possible, that the trainees are given the opportunities to utilize their new knowledge when they return to their jobs in the developing countries.

Motivation: Certification and Prizes

27. A certificate of satisfactory completion of training provides a useful and effective element of motivation, particularly to trainees from overseas countries. Any commendable performance should be suitably endorsed in the certificate. A small cash or other reward could be valuable adjuncts in such a process of motivation.

Discipline and Control

28. On the other hand, it should be made explicit in the letter of acceptance that a participant could be sent back home in the event of persistent neglect, inattention or misconduct, at the discretion of the training organization or the promoters of the training. No doubt it would seldom be necessary to take such a harsh step, still, it is felt better to provide for such possibilities.

Preparation of a Log Book

29. Where applicable, trainees may be expected to prepare a log book covering all the work centres through which they have passed, recording their observations and suggestions. To facilitate systematic presentation, it would be desirable to indicate to the trainees the lay-out, sequence and method of preparation of the log book at the outset of the training programme.

Work Project or Exercise

30. During the concluding stages of the training, trainees, either individually or in groups, should, whenever possible, undertake a project or exercise. Such projects should reflect the extent to which the trainees have assimilated the practical knowledge of the production process in which they have been trained.

Training Programme Evaluation and Follow-up

31. The Ad-hoc Meeting feels that follow-up of the intermediate in-plant training programmes, organized by UNIDO, is essential. Very little follow-up has so far been undertaken. It, therefore, suggests that UNIDO be provided with staff, budget and other resources, not only to undertake follow-up of training programmes which have already taken place but also to ensure adequate administration and follow-up of programmes which are planned for the future. The ad-hoc Meeting felt that the follow-up of in-plant training programmes should be undertaken in two stages:

1. Appraisal of the training programme at its conclusion. This would be a joint function of the participants and the training organization;
2. Impact of the training. This would be conducted by UNILCO authorities with the co-operation of trainees and their employers, to find out to what extent the training received by the participants was of practical value and had been utilized.

VI. RECOMMENDATIONS

REGARDING THE FUTURE WORK PROGRAMME OF UNILCO

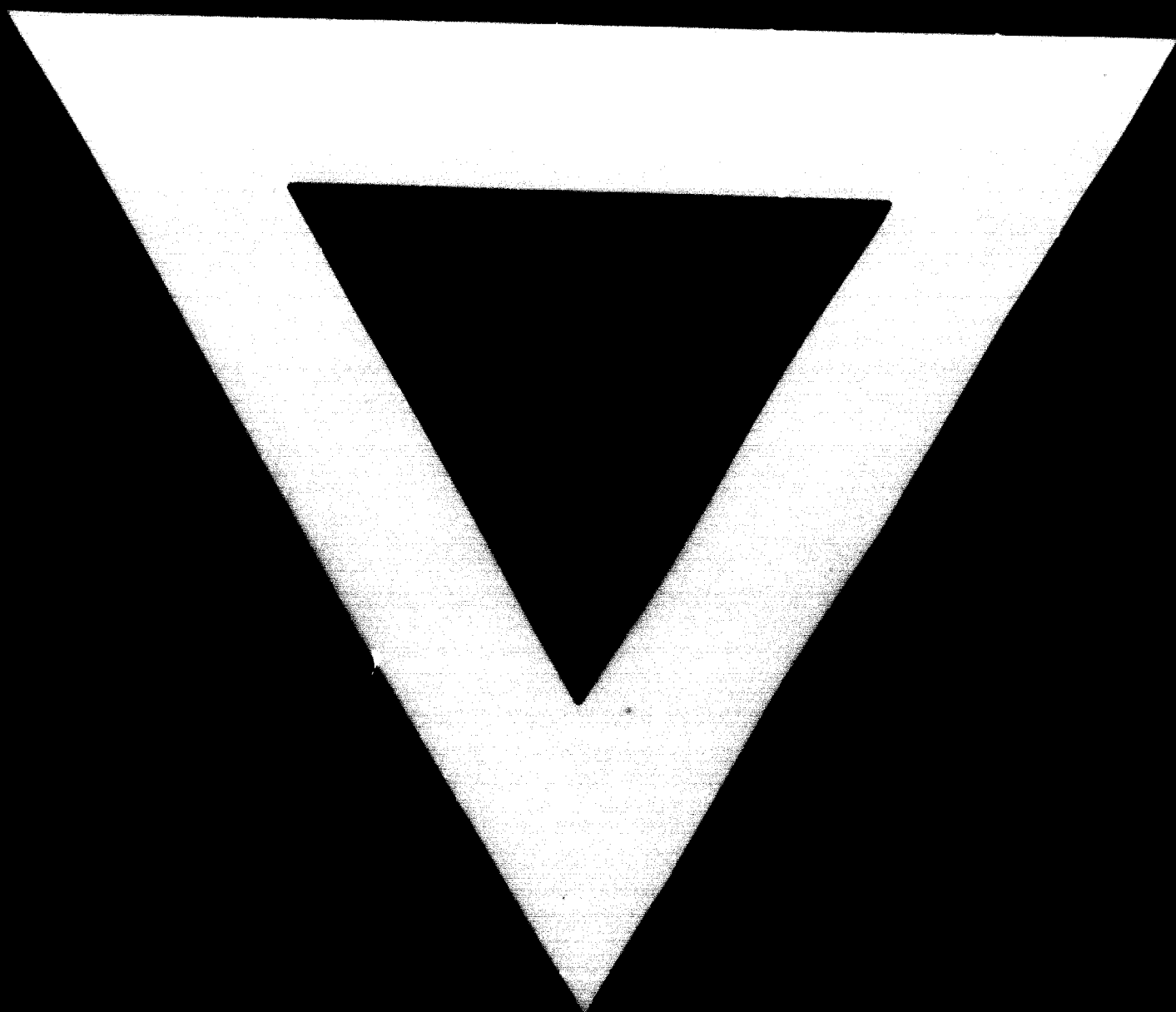
IN THE FIELD OF IN-PLANT TRAINING

32. The Meeting of Training Directors, noting the need to help bridge the gap between supply and demand of adequately trained engineers and technicians in the developing countries, and recognizing that in-plant training offers the quickest and least expensive means of developing the required skills and specializations, recommends that UNILCO should:

- (a) Continue to promote and organize in-plant training programmes in the industrialized countries for engineers and technicians from the developing countries, in accordance with the suggestions indicated in section V. of the present report;
- (b) Develop an integrated international programme for in-plant training within which it can promote, assist and co-ordinate various types of training programmes as suggested in section IV of the present report, i.e. based on a branchwise approach a distinction between basic, intermediate and advanced levels and covering training in the developing countries on a national and regional basis, as well as interregional training;
- (c) Pay particular attention to the following matters in programming such training programmes:
 - (i) proper selection and preparation of trainees;
 - (ii) future development and specialization of the trainees;
 - (iii) division of trainees into manageable training groups;
 - (iv) proper selection of available training facilities with the view to meeting the training requirements and specializations of the trainees.



- (d) Seek the co-operation of the industrial enterprises and institutes in charge of conducting the in-plant training programmes, organized by UNIDO in the industrialized countries, in designing the course curricula in such a way as to assure the incorporation of the following:
- (i) top management participation in the training programmes;
 - (ii) assigning specific, meaningful and practical job assignments to the trainees;
 - (iii) provision of appropriate certificates describing the professional experience obtained by the trainees;
 - (iv) individualized tutorship, where required;
- (e) Provide for follow-up activities regarding the in-plant training programmes organized in the industrialized countries. These activities are considered important to evaluate to what extent the "know-how" learned during the training period is put to use by the trainee in the actual conditions of the industrial enterprise in a developing country. Moreover, follow-up activities can serve as a feedback mechanism for changing and adapting existing types of in-plant training programmes in the industrialized countries to the needs of engineers and technicians from the developing countries;
- (f) Provide adequate financial support through its technical assistance programmes, and make available to governments and industrial enterprises in the developing countries expert assistance and teaching materials on in-plant training of engineers and technicians. In particular, the preparation of in-plant training manuals for specific industries is considered an urgent matter, in order to undertake the national or regional training programmes suggested in section IV. of the present report.



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