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NEW TRENDS IN POLYTECHNICAL
EDUCATION WITH SPECIAL REFERENCE
TO PLANNING OF MANPOWER DEMAND
IN THE LONG RUN.
(EXPERIENCE FROM THE G.D.R.)

By

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DEMAND IN THE LONG-RUN

(EXPERIENCE FROM THE GERMAN DEMOCRATIC REPUBLIC)

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New Trends In Polytechnical Education With
Special Reference To Planning Of Manpower
Demand In the Long-Run

(Experience from the German Democratic Republic)

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The systems of manpower planning and of education as well are based on two main principles: :

- (I) Full scope must be given to the development of talents, gifts, skills etc. of every individual. This means that all restrictive elements related to this development must be removed.
- (II) Man is the most important productive factor. Manpower, therefore, must be trained according to the tendencies and rising levels of technique and technology and, moreover, in conformity with the structure of the national economy.

Whereas the first principle gives the general background, the humanitarian aspect of socialist (manpower) planning, the second one is related to the specific skills, vocations etc. which must be provided by the educational system. It should be stressed that this system must be closely linked with the planning system as a whole. Moreover, it seems to be an almost unmanageable problem to set up an adequate educational and training system without having proper national planning. A clear-cut idea and conception of further social, technical and economic developments in the country are, consequently, a prerequisite of successful activities in this field.

I. The actual system of polytechnical education

The educational system of the G.D.R. was basically changed some years ago (1958/59) in accordance with the two main principles. The second

one, however, was the most important because the first principle has been realized all the time since 1945/49. It had become necessary, therefore, to bring the educational system in line with the modern industry and agriculture. The formulation of the second principle can be regarded as a generalization of what has been felt inevitably at that time.

Practical life and school had to be brought together. In terms of pedagogics this meant to set up a system of education which is able to prepare the young generation for practical life or, to put it more exactly, to prepare them for practical work. The school system, moreover, had to be combined accordingly with production and productive work of the students.

With reference to this basic conception a new teaching program as well as a new organizational scheme had been worked out. The new program was the concept of polytechnical education which deals with the general technical, technological and economic problems of modern industrial and agricultural production. It covers also the basic subjects for this activity e.g. physics, mathematics, biology and chemistry which took over a leading position on the syllabus of the secondary classes.

Practically, this plan had to be carried out by including in the teaching program a new subject called 'Introduction to industrial (or, in rural areas, agricultural) production". In addition to this, another measure had been taken. One day every week the pupils of the advanced forms are trained directly in industrial enterprises or in state or cooperative farms. Experts of the respective enterprises are in charge of this training. They are assisted, of course, by the teachers with respect to the pedagogical problems involved. This kind of training consists of two parts; in the first the pupils are given information on the respective factory, its production program and how the various goods are produced. After this, the pupils have to do certain productive operations themselves.

By this way all the children can understand not only the production as such but also the problems of organisation and planning of production as well.

Simultaneously, efforts have been made to change the contents and teaching methods with respect to those subjects which are more or less related to production, i.e. mathematics, physics, chemistry, biology and civics.

The economic, political and technical problems of the enterprises where the pupils are trained and where they participate in productive work are now part of the teaching programs of the subjects mentioned above. Training thus, becomes a combination of theoretical and practical education and of mental and physical work as well.

Under the new conditions the school time had to be extended by two years in order to cope with the requirements of the new principles of education. A law had been issued stipulating the gradual introduction of the 10-year polytechnical secondary school which will be compulsory for all children not later than in 1964. It is clear that this new system cannot function totally unless all preconditions are available, i.e. new schools, training of new teachers, measures at the enterprises with the view to provide proper training facilities for all pupils etc.

The results of the new polytechnical system which have been reached so far, are positive. The standards of education have been raised considerably and school has now become, in the proper sense of the word, an institution connected with and training the youth for life. The idea that education for productive work is the basic one, is now generally acknowledged. The experience with this system predetermines to a certain extent the lines on which the next stage of polytechnical education should be set up.

There are however, some problems related to manpower planning which had not yet been solved.

At that time when the new polytechnical education was starting, no data had been available as regards the detailed trends in manpower

demand. It was clear, however, that the standards of education have to be raised in general in order to keep up with modern techniques and technologies. The means was, as we have seen, that all workers will have to undergo a 10-year polytechnical education. By this way unskilled and semi-skilled labour could be abolished because there will be no demand of it anymore in the long run. So far, there was no danger in the fact of not knowing quantitatively and qualitatively the manpower demand because these measures mentioned above are without any doubt in line with the general tendencies in this field anyhow.

In the first stage of polytechnical education, however, applicants for vocational training in certain trades had not been admitted unless they are graduates from the 10- or 12-year school. This, obviously, was in accordance with the higher standards of education needed for modern production. It was, however, limited to a list of selected professions as such. No account could be taken of the exact number of qualified personnel required for the various branches of industry etc. Consequently, there was a need of a long-term plan of the whole national economy or, at least, on outline of such plan. This outline, covering the period from 1964-1970, is now worked out. It gives the structure of the German economy, which will be reached during the years, to come with due regard to, first, the national potentiality traditions etc. and, secondly, to the scheme of international cooperation and specialization which had been agreed upon in 1962 by the member-countries of the council of Mutual Economic Aid. Now the general trend to higher standards of education and vocational training can be specified quantitatively and qualitatively by branches, professions and levels.

Finally, it takes some time to provide the material, financial funds, and the additional training staff for the extended education system. This problem will be solved in the second stage.

II. The advanced system of polytechnical education

I. The basic idea of education

The modern socialist economy depends upon high productivity which, in turn, requires high skills of the whole labour force. As high productivity and adequate skills as well are the result of intense mental and physical work it has been found that education has to develop, first and foremost, a sound attitude to work in general and a proper estimation and respect of any kind of work. It is the intention to bring up the young generation in spirit of own creative work already during school-time and to have them feel responsible for all national affairs. Education, therefore, is a process of active participation in learning and studying and not only of receptive activities of the pupils and students. The youth must be trained for managing freely all social, technical, economic affairs of the new society.

Education aims at teaching the youth, as early as it is possible, that one cannot live without working and that, moreover, the living standards of the whole society and of the individual as well will be the better, the higher its labour productivity actually is.

2. The concept of having a comprehensive educational system

The G.D.R. educational policy now tries to keep up with scientific-technical progress in a rather detailed manner. With a view to this idea measures are being taken to establish a well-knit system of education ranging from the kindergarten up to the university level. This is not a problem of administration or organization but rather of coordination of education programs and syllabi between the different parts or stages of this overall system.

It goes without saying, that a direct coordination of this kind will make education more effective. The results of the previous stage can be used directly as the starting point for education at the next level, thus eliminating all overlapping, with respect to the contents of educational programmes at the different stages, and also any abrupt changes in both

methods of teaching and learning and problems taught. There must be a continuity and sequence in teaching and learning without interruption owing to the transfer of the youth from one stage to the other. This system as a whole is subject to the general principles discussed before. We should like to stress this point because the word "coordination" may mislead the reader that the problem is only to combine the existing school-systems thus arriving at an overall system. This is not true. The first task is to put forward the general idea and then to think about the different parts of the whole system according to the different ages of the youth, to the different stages of their physical, mental, and psychological standards.

Although the detailed program for the whole system is yet under discussion we shall give an outline of its structure:

(a) Kindergarten

(3 years)

(b) 10-year school

("General Polytechnical Secondary School")

(ba) junior stage (4 classes)

This stage will be improved with a view to start teaching of specialised subjects (physics, chemistry etc.) already before the 5th class.

(bb) senior stage (6 classes)

More emphasis (both qualitatively and quantitatively) will be given to mathematics, chemistry, physics, German and Russian.

(c) Extended secondary school

(2 classes)

Training at this stage will be combined with the vocational training; i.e. graduates from the extended secondary school will get a maturity certificate and, in addition to this, a professional (vocational) certificate.

(d) High school(university)

Academic training will be combined with direct practical activities

in the respective field of study.

In the G.D.R. exists also a system of Technical Schools (Fachschule) which are attended by graduates from the 10-year schools and to a certain degree, from the 12-year school. Their standard is between Extended Secondary School and the University level. We did not mention them in our scheme because they face principally the same problems like the academic training system.

Statistics tell us that in 1962 almost 77% of all pupils aged 14-15 years had been transferred to the 10-year and 12-year schools; i.e. only 23% entered the vocational school system after having finished the old 8-year school which is replaced gradually by the 10-year school.

It may be surprising, perhaps, to learn that the kindergarten will be included in the overall educational system as a preparatory stage because it is not (and will not be) compulsory. But figures show that in 1961 almost 55% of all children between 3 and 6 years attended the kindergarten. And there is a trend that this percentage will increase also during the next years. The great number of children attending the kindergarten justifies the idea of an overall system with the kindergarten as the initial stage.

3. Education and manpower demand

Once there is a clear-cut conception of the long-term national plan indicating the leading branches of the economy it becomes possible to set up an educational program which is in line with the manpower requirements. In the G.D.R. the leading branches are:

- (i) chemical industry (oil refining and processing);
- (ii) metallurgy (second processing stage);
- (iii) electrotechnical industry (electronics);
- (iv) mechanical engineering;
- (v) construction of scientific instruments;
- (vi) power generation, and
- (vii) transport.

Now planning is given the task to determine the technical development (mechanisation, automation, new techniques, plastics, etc.) within the planning period both quantitatively and qualitatively as exactly as possible and to work out the manpower plan on the basis of these data.

In the first stage two methods were used :

- (i) Planning based on the data of representative factories. The starting point was the technical pattern of the branch concerned, then the changes in the manpower structure were estimated, and lastly the results were generalised for the entire branch.
- (ii) Analysis of the level of production of techniques in the branch concerned and an overall estimate of changes in the manpower structure on the basis of the future development of technique and production.

The economic analysis shows that there is a particularly close link between the development of investments (essentially that part contributing to the further increase of labour productivity) and the structure of the qualification of workers engaged in production. The more rapid the technical development, the more rapidly grows the share of qualified skilled workers. This relationship supplies data suited for overall planning.

These data may be specified by:

- (i) Index numbers covering changes in the structure of machinery and equipment (share of universal machinery, semi-automatic and fully-automatic machines etc.)
- (ii) Index numbers covering changes in the structure of ways of production (share of individual units, mass production, etc.) This provided conclusions for altering the divisions of labour within the factory.

Other important indications for manpower planning result from changes in the structure of the technological main trends in a branch of

industry. These changes give direct information on changes in the structure of employment (e.g. transition from using wood and metal to the application of plastics and relevant changes in the demand required for the vocation concerned).

These data, in connection with the leading branches, are the quantitative and qualitative background for calculating the demand of manpower by number, by skills and by vocations. It is now the intention to coordinate these data on manpower demand and the new education system. The system of polytechnical training, therefore, will be elaborated and transformed into a system of preparatory vocational training. This, of course, has to be done on many lines.

3.1. Extension of teaching basic problems of science and technology

The share of mental work in total productive labour input is increasing rapidly. Accordingly, education has to be concentrated on the scientific-technical basis of modern science and technology already during the junior stage of the 10-year school. A greater part of the respective syllabus will be occupied, therefore, by mathematics, physics and chemistry. Teaching methods with respect to these subjects have to be approved with the view to increase the active knowledge of the pupils. This proved difficult because at the junior stage, of course, pupils cannot be trained at industrial (etc.) enterprises. One way of improving the standards of education in this field will be, perhaps, to extend the training of the two subjects "handicrafts" and "work in the school garden" by teaching the elementary problems of the most important production processes. It is intended also to include in this training program at the junior stage some elements of economic and technical-designing reasoning.

Proceeding this way overall education in the basic subjects can be strengthened to an extent which will meet, first, all requirements of broad-scale education of the whole young generation and which, secondly, provides a solid basis for a more specialized training at the senior stage of the 10-year school. In the G.D.R. much stress is laid on such large-

scale basic education. This is to eliminate any risk of an extreme special training. Though modern industry can be characterized by a rapid process of division of labour, education must not follow this line accordingly. This would lead to rather adverse results: one-sided skills (which would actually mean lower standards of education) and, finally, no further increase in productivity. This equally, is an experience of industrialized countries of either social system. The German education system, therefore, tries to enforce the basic subjects on the field of science and technology. Thus the problem of improved mobility of the labour force can be solved.

3.2. Full scope to all talents

The 10-year school system helps discover the different talents etc. of the youth. The teaching staff is requested to pay more attention to the talents of the pupils with the view to further them by specific methods. In other words, there will be a combination of general education for all and additional or, at least, intensified training for those who are markedly gifted in a specific field. This principle is to be applied at all stages of the overall educational system described before. For that purpose several measures will be taken:

- (i) Establishment of specialized learning groups which will be active after school-time under the supervision of teachers. This system can work, preferably, at full-day boarding schools which are set up in different urban and rural areas.
- (ii) Establishment of specialized schools which provide an extended training in specific fields for those who are gifted therein; e.g. mathematics, physics and chemistry, foreign languages, music, sports.

It is clear that this kind of specialized education by no means will replace the general teaching program nor will it predetermine the specialized vocational training of the youth attending the schools with an extended special training. This system has to give everybody a chance of developing one's talents as early as possible in addition to the general education scheme. How these talents will or can be utilized has to be decided

later. This decision can be taken in full accordance with individual and national interests, without any doubt, if we know exactly all talents and to which extent they can be developed substantially.

3.3. Training at industrial enterprises

Tests are being made to elaborate the polytechnical training system in enterprises themselves. They aim at two things:

(i) If it is true that productivity of the future period has to be prepared by an adequate education system in the present period, the enterprise training should proceed at modern machinery. The traditional training (vocational) centres usually do not have such modern equipment. Consequently, the students both from the upper forms of the senior stage and the extended secondary school will be trained once a week in the production process of modern enterprises directly. By this method they will be trained not only technically but also with due regard to planning problems, social behaviour and modern organization of production.

All enterprises which serve as training centres, therefore, have to make arrangements in order to include this training as well as the productive work of the youth in their normal work program.

(ii) During the last years of the senior stage of the 10-year school a vocational training will start. This system will cover the elementary problems of several vocations which are rather homogenous e.g. chemical industries, electrotechnical engineering, mechanical engineering. This is the starting point for a specialized vocational training at the extended secondary school (12 years). For that purpose certain forms will be established which provide each a training for one trade. Students who are interested in this specific training have to be transferred from the "normal" forms to those with an extended vocational training.

This system can work provided there is a clear plan of manpower demand. Therefore, first attempts are made in certain industrial centres with one or several leading branches of the German economy. In these areas

manpower demand and supply can be easily balanced by number and by vocations. Besides, there are sufficient training facilities of the enterprises which are located in the respective regions.

By this way the young generation gets an up-to-date general and vocational training with a guarantee to be provided with a job according to their training. Moreover, their individual interests with respect to the future professional activities are step by step brought in line with those branches and trades which are given priority in planning. This is to serve both national and individual interests in this field. Conflicts between both can be avoided or, at least, be made less serious.