

A REPORT PREPARED FOR:  
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GOVERNMENT OF EGYPT

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## I. INTRODUCTION

As I understood it, Allan Salt's and my original tasks were to determine the present status of technical vocational education in the GOE both in the agencies of government and in the private sector. We were advised that our analysis should deal with current and project manpower demands, the present production of skilled manpower through existing agencies, and the projected production in existing agencies and in others which may be created, and make recommendations as to possible approaches to resolve that problem.

In addition, we were to carry out a feasibility study on the proposed Mohar Training Agency Project. The feasibility study was to include: a review of the objectives of the training agency, the data, the assumptions on which they are based; a review of the proposed activities, and the proposed implementation plan. We were also asked to make recommendations to the Mohar and to the A.I.D. Mission on the feasibility of the proposed project and on alternative approaches. This report will be forwarded soon as a separate addendum to this paper.

Prior to my departure for Cairo, I reviewed the "Highlights of the meeting of the Joint Working Group on Education and Culture Cairo, 14-15 January, 1977." This review surfaced the following items which were relevant to my visit:

1. Possible areas of cooperation between Egyptian and American universities.
2. A feasibility study on the applicability of American and European books, periodicals, and audio-visual instructional soft-ware for use by Egyptian university faculties.

3. Interest in a community college experiment.
4. Egyptian interest in developing a capacity to produce certain audio-visual equipment and laboratory instruments.
5. An agreement by U.S. Aid to provide the Ministry of Higher Education with examples of two film series in physics and chemistry as possible teaching aids.
6. An agreement by U.S. Aid to bring U.S. specialists to review Egyptian plans for the establishment of technical institutes in the Canal Zone and in other areas.

My observations based on the numerous individuals I spoke with and the ministries and schools I visited (see Attachment #1) as well as a review of the various reports has led me to list the following general assumptions which are basic and crucial to my recommendations:

Egypt is suffering from a growing shortage of skilled workers which hampers the country's efforts to rebuild the cities along the Suez Canal, attract new industry, and improve public services.

Tens of thousands of Egyptian construction workers, electricians, mechanics, technicians and administrators have been lured abroad by far higher salaries than they could earn in their own country. Most are in other Arab countries, particularly Libya, Kuwait, Saudi Arabia and the countries along the Persian Gulf. The country's most highly trained technicians leave, and due to the inadequacy of training the Government cannot get the replacements they need. The number leaving is accelerating rather than diminishing.

Contractors and businessmen complain that while Cairo is teeming with people who have no real jobs, they are unable to find the workers they need for positions that require training or skill. It is very difficult for management to find persons who are physically fit for industrial employment because of Egypt's low standard of living and because local workers lack "industrial traditions" such as working in the same place at the same time for the same number of hours each day.

At the same time, the unskilled and barely literate masses in the country are proliferating at a staggering rate. The country's population, 10 million at the start of this century, is now 38 million. Nearly half are children under 15.

Present projections are that the population will double by the year 2,000, which would far outstrip the country's ability to feed and house its people, let alone improve their standard of living.

While higher salaries paid in hard currencies are luring its best workers abroad, Egypt finds itself unable to replace them because of antiquated training methods, widespread illiteracy, a shortage of capital and a traditional disdain for technical or manual work.

Many young people who now insist on going to universities, even though there is no real work for them to do when they graduate, do not see the virtue of "productive labor" and therefore do not go into vocational training. Since university graduates are guaranteed government employment, every ministry and department is vastly overstaffed with people who have small salaries but high status.

The economy of the GOE will increasingly require more highly skilled workers in spite of the fact that jobs for the unskilled will continue to make a heavy demand on available manpower. In the vocational and technical schools that I was able to visit where the instructors were probably the best that could be observed, it was apparent that the teaching population is anachronistic in skills, and inadequately trained to meet new demands. Old but expensive equipment is often inefficiently used. Curricula when available appeared to be outdated and inadequately prepared to meet their objectives.

Concern for education and training reform in vocational and technical education was not clearly articulated in any of the reports that I read or by any of the individuals that I conferred with. There appears to be a requirement for numerous needs-assessment studies to meet the idiosyncratic needs-requirements of individuals but also the manpower requirements of the developing industries in Egypt. This assessment cannot be made, however, without an adequate information base. It appears that education and training planners designing programs for vocational and technical training are much too often "shooting from the hip" because they have been unable to identify that type of learning information which will help the individual to identify and acquire the practical knowledge and skills necessary to realize his maximum potential.

These assumptions make for a very bleak picture. Therefore, the basic thrust of my suggestions and recommendations is that USAID support be critically applied in those areas where key planners and implementers can

be trained to solve their own problems with the appropriate transfer of the latest and most successful training technology that can be identified in the field of technical education.

Finally, I would like to stress that this report does not address all the major issues with respect to technical education Egypt. There was neither the time nor the supporting data to do so. My personal concerns, however, with the problems confronting the country with respect to technical education are such that I will continue to provide additional input to the Chairman of the Task Force and the USAID Mission in Egypt as I acquire additional information and insights.

## II. OBSERVATIONS

The following observations were derived not only from my short and rather erratic visit, but also from a review of the documents and studies which are listed in Attachment #V2. (A key document in this respect was the World Bank Proposal "Appraisal of an Education Project in the Arab Republic of Egypt.")

- Egypt has a land area of one million square kilometers, but only 4% is arable land. In 1974, the population was about 36.4 million, and was increasing at an annual rate of 2.5%. With a population density of over 1,000 per square kilometer of inhabited area, Egypt is one of the more densely populated countries in the world. Forty-two percent of the population is under 15 years of age, which places a heavy burden on the educational system and the family wage earner.

In 1974, Egypt initiated a new economic policy designed to promote rapid economic growth through liberalization of the economy, decentralization of decision making, and incentives for private domestic and foreign investments. This modernization program required large increases in the supply of commercial and industrial technicians, and in the number of skilled workers.

NEW  
ECONOMIC  
POLICY

PLANS FOR  
RAPID  
INDUSTRIALIZATION

Present plans call for rapid industrialization with a substantial increase in the value of industrial output over the next 25 years. Of primary importance will be the development and exploitation of the country's mineral resources and related industries (oil, phosphates, petrochemicals, fertilizers, and building materials), new power development, land reclamation and irrigation, exploitation of the Suez Canal potential, and tourism. Rapid developments in these fields will require a modernization and extension of the country's infrastructure (ports, transportation, telecommunications), and will provide an impetus to other important industries (building construction, chemicals, food processing, textiles, mechanical industries, electricity and electronics, shipbuilding, and repair).

EMPLOYMENT  
SUMMARY

Total employment, estimated at 9.3 million in 1975, has grown at a rate of 2.3% since 1967-68 during which time agriculture's share has dropped from 50% to 45%, other commodity sectors (mainly industry) have increased from 14% to 18%, and the distribution and service sectors increased slightly. (Refer to World Bank Report, Annex 3.)

The problems of employment are further complicated by the government policy of automatically providing jobs in the public sector, regardless of its needs, to all university graduates unable to find employment elsewhere.

URBAN  
EMPLOYMENT

Urban unemployment is probably small (according to a recent survey, registered unemployment was less than 2%, but underemployment and low productivity employment, as well as seasonal unemployment in rural areas, are reported to be significant. Urban underemployment is accentuated by the drift of unskilled rural labor into the towns.

Urban employment is eased somewhat by the emigration of Egyptian workers, especially to neighboring Arab countries. This emigration is stimulated by much higher salaries which attract educated and skilled personnel from categories which are in excess supply, as well as in great scarcity in Egypt. The absence of statistics on the number and skill level of emigrants makes it difficult to determine the net economic effects of the outflow, and to predict the effects of a possible decline (or future return flow) in the number of migrants.

LITERACY  
TRAINING

- Literacy training has had relatively little success in Egypt. Although a Council for Adult Education and Literacy was established in 1972 in every governorate, there has been little advance on the illiteracy problem. A 1970 law required all ministries, organizations, institutions, societies and large employers to arrange and conduct literacy programs for their employees. The Ministry of Education furnishes the planning and supervisory personnel and the employers provide the facilities and expenses. While these efforts have met with some success in urban areas, they have had little effect on the millions of rural illiterates.

LITERACY  
AND  
LABOR FORCE

- According to a 1972 sample survey, nearly 61% of the total labor force was illiterate and another 25% only able to read and write; a very low 1.4% of the labor force had post-secondary technical level education, but a surprisingly high 3.6% had a university or post-graduate degree. (Refer to World Bank Report, Annex 4.) A more recent survey of public manufacturing companies showed that 6.1% were employed in professional and managerial positions, 3.7% were technicians, 27.5% supervisors and skilled workers, whereas 55.6% were classified as semi-skilled and unskilled workers. (Refer to World Bank Report, Annex 5.) In the building industry, only 42,000 workers, or 10% of total employment, are considered to be skilled.

STUDENTS IN  
TECHNICAL  
EDUCATION

There were over 300,000 students in university education in 1975-76 (a number which is still rapidly growing). The annual output of graduates is soon likely to exceed 50,000. In contrast, in 1975-76, there were only 31,000 students enrolled in post-secondary industrial and commercial courses with an annual output of about 9,000. If secondary technical school enrollments are included (370,000 students in 1975-76), it should be pointed out that only 98,000 were in industrial courses.

COLLEGE  
AT  
MATARIA

- The College at Mataria produces theory and laboratory teachers for the post-secondary technical institutes and, to a lesser extent, for the five-year technician training schools. The school at Kobba anticipates producing theory and laboratory/workshop teachers for the MOE three- and five-year schools, and workshop teachers for the post-secondary institutes. The output of these two institutions will be adequate to meet the needs of the project institutions during the plan period. Both of these institutions suffer from a lack of equipment and other teaching/learning aids, although they are much superior in this respect to the technician training schools and institutes.

- Agricultural education and training is administered mainly by the Ministry of Agriculture and Land Reclamation with the

..... Ministry of Agriculture and Land Reclamation (Agriculture) Schools .....

MINISTRY OF  
AGRICULTURE

controlled by the Ministry of Education. About 45% of the labor force is engaged in agriculture, and current development strategy lays emphasis on horticulture and animal husbandry, together with agricultural mechanization and food and fiber processing. The large oversupply of agriculture graduates and veterinarians contrasts sharply with minimal efforts in farmer training programs. Extension advisory services are provided by about 5,000 higher education graduates. Of eleven Ministry of Agriculture training centers, only five provide for training of farm leaders. Curricula are not sufficiently relevant, and there is not enough practical training for higher and middle-level personnel.

MINISTRY  
OF  
SOCIAL  
AFFAIRS

- The Ministry of Social Affairs organizes various two-year pre-vocational courses for rural boys and girls. There is at least one such training center in each province (23) and about 3,500 students enrolled. Graduates are supposed to return to work in their home communities.

MINISTRY  
OF  
INDUSTRY  
AND  
MINERAL  
RESOURCES

- Vocational skills training for the industrial and construction trades are the responsibilities of the Ministries of Industry and Mineral Resources and of Housing and Reconstruction. The two approaches show considerable difference.

- The Ministry of Industry and Mineral Resources has an experience extending over 15 years. Its combination formal training and apprenticeship system is one in which, recruited generally from

MINISTRY  
OF  
HOUSING  
AND  
RECONSTRUCTION

the preparatory graduates, trainees spend one year in the training center and two years in industry with part-time day release to further their theoretical knowledge of the particular branch of industry in which they are engaged. The centers are generally well designed, but much of the equipment needs replacement, and some additional equipment is essential if the centers are to keep abreast of current industrial practice. The 28 existing centers, many of which are operating on double shift, are able to accept some 5,000 new apprentices per year.

In sharp contrast, the Ministry of Housing and Reconstruction has much less experience in the training field, and is faced with an urgent need to carry out construction of an unprecedented scale, partly to replace buildings destroyed by war and partly to meet the demands of a rapidly increasing population. With certain exceptions, the formal apprenticeship method is not common in the building trades, its place being taken by short periods of training either "on-the-job" or in building trade centers. The Ministry has only four such centers, and is forced to make use of the poorly equipped secondary technical school facilities to help meet current demands. Moreover, in order to increase the immediate output, the Ministry has limited the length of its courses to three months in place of the more usual six months. Current admission requirements to training programs are that candidates be able to read and write. The four existing centers are able to offer some 650

places with an output of about 1,800 per year. To expedite the construction program, the Ministry has purchased, and plans the further purchase of a number of existing buildings for conversion to training centers. The project will provide equipment for buildings providing further 6,000 places with an annual output of 17,000 craftsmen.

A secondary but also important aspect of the work of vocational training centers is the provision of short "upgrading" and "refresher" courses for those already in employment. The Ministry of Industry and Mineral Resources provides for an intake of some 2,000 trainees in these categories, and occasional provision is also made for the training of operatives in "accelerated" courses, normally of six months' duration. The Ministry of Housing and Reconstruction plans to introduce "upgrading" and other such courses when more accommodations become available. It is anticipated that the World Bank's proposal will produce an annual output of 17,000 semi-skilled building trades workers who would help satisfy the urgent demand for housing, the modernization and expansion of infrastructure, and rehabilitation activities throughout the country. Additionally, the project would enable 6,400 technicians and instructors, and 2,300 skilled industrial workers to enter the labor market annually with increased levels and ranges of skills resulting from improvements in existing curricula, introduction of new disciplines, provision of modern and more appropriate instructional equipment, and the training to be provided to selected members of the teaching and administrative staffs of the project institutions. The Project's

MINISTRY  
OF  
INDUSTRY  
AND  
MINERAL  
RESOURCES

WORLD  
BANK  
PROPOSAL

pre-investment designs of additional (a) comprehensive lower and upper secondary schools and primary teacher training colleges (combined 7,200 new student places), and (b) vocational/technical training institutions (combined 23,800 new student places) would permit early action, through either a possible second World Bank education project or other financing to improve further the quality of the formal education system, and to increase further the output of technically trained personnel required by the economy.

The World Bank project provides for:

Construction, furniture, equipment, and technical assistance for:

- 20 building trades vocational training centers
- 3 building trades instructor training centers
- 2 technician training institutes

Furniture and/or equipment and technical assistance for:

- 4 technician training schools
- 3 technician training institutes
- 1 technical teacher training school
- 10 vocational training centers
- 1 industrial instructor training center

Pre-investment engineering design and/or technical assistance for

- 6 technical training schools
- 4 technician training institutes
- 5 industrial vocational training centers

### III. DISCUSSION AND FINDINGS

NO  
SYSTEMATIC  
REFORM  
PLAN

Although the social and economic goals of the GOE include increased employment, production, and a social democracy of full participation, there is no systematic educational reform plan that I was able to identify which would consolidate the fragmented efforts in vocational and technical education. Such a plan needs to be developed as soon as possible and should have as its basic thrust a shift to one which is practical and work related.

TEACHERS  
MOTIVATED  
-  
INADEQUATELY  
TRAINED

It was my impression that the teachers in the system were invariably highly motivated in spite of very inadequate salaries and in spite of the lack of sufficient materials and equipment. In addition, the teachers appeared to have an urban bias towards the curriculum, as well as appearing to be inadequately trained in the use of modern teaching technology.

TECHNOLOGY  
TRANSFER

Amartya Sen in a study prepared for the International Labour Office within the framework of the World Employment Programme titled: "Employment, Technology and Development,"<sup>1</sup> cautioned us with rushing into the problem of technology transfer by stating that, "There is, however, a danger in taking too 'dynamic' a view of the problem of technology. Technology is certainly created by looking for it, but there also exists at any point of time a vast collection of already evolved techniques. In some ways our direct choice must be related to the existing stock, even though the choices made will alter the stock and add to it, and indeed this will be an important consideration in the optimal choice of techniques. The view that the past menu is basically 'inappropriate' and we must rely on 'making' our own

technology by looking for it, while full of healthy vigour, is not always a very useful approach. To recognize that a whole lot of techniques already exist no matter what we do would seem to be not entirely a negligible thought." (Italics mine)

It is important to emphasize the difference between the transfer of technique and the transfer of technology. As I see it, it is a systematic application of empirically-based knowledge systems to the solution of practical problems. Therefore, the rubric of education and training technology is the systematic application of any knowledge base in any field of human endeavor which will assist us in solving the problems of education and training. Consequently, the problems of transferring such technology which will assist the Government of Egypt (GOE) in solving the problems of manpower development must concentrate on developing its manpower skills which will bring about the transfer of the education and training technology. What we are talking about is technology that is scientifically based rather than technique.

INSTRUCTIONAL  
SYSTEMS  
TECHNOLOGY

The most appropriate technology that has surfaced to date that is relevant to the concerns that were articulated during my short visit is, I believe, the development of the instructional systems approach to the partial solution of education and training problems, facing the manpower requirements of the Egyptian Government. The nine characteristics of this approach are attached to this report as Attachment #V3.

A question arises as to how to effectively build on the present resources in developing a viable vocational and technical training program for the GOE over the next 10-20 years. Plans for short-range goals should not anticipate results before 5-10 years. Plans for long-range goals should be within the 20 years time frame.

NEGATIVE  
ATTITUDE  
TOWARDS  
TECHNICAL  
EDUCATION

The emphasis must be on relating projects more closely to what the local, regional, and national conditions can bear. It should be recognized that the primary reinforcers are money and attitude towards technical education and training. Therefore, I think it is imperative that the GOE embark on a national program of changing the presently existing negative attitude towards technical education.

In addition, any national program of integration of vocation-technical training programs for the GOE certainly should consider the role that the World Bank project will play. I certainly advise that the USAID support should augment the World Bank project in many aspects, but basically the thrust of my recommendations is that AID guidance at this point should be for policy planning and integration. Thus, the initial recommendation for a series of studies. (Refer to Recommendation #1.)

AID  
ROLE  
PLANNING  
FACILITA-  
TIVE

Perhaps the greatest single difficulty with projects at the level of technical schools and training centers for skilled trades is the tendency of the students to use them as stepping stones to other types of education than those for which they are intended.

The government policy of automatically providing jobs in the public sector to all university graduates unable to find employment elsewhere, further complicates the problems of employment. This not only contributes to considerable overstaffing and consequent underemployment, but also rewards students' preference for university high status educational programs and their bias against middle-level technical careers.

In addition, employment of workers abroad contributes a major element of uncertainty in manpower planning.

Thus, if a good technical school is set up to help meet the general shortage of middle-level technicians, it will frequently be regarded by parents and students, and even by the instructors, as a lower form of higher education rather than a terminal form of middle-level education. This leads to its output being overacademic and not related to actual work needs.

It should be mentioned that, in my opinion and that of others, the effectiveness of skill training in these schools is so low that many of the students are unable to obtain technical jobs upon graduation in spite of the increasing shortages. Therefore, this population cannot be considered a viable part of the skilled manpower available.

The barrier that the negative attitude towards technical education creates is often times insurmountable even in conditions where the facilities are well-equipped and managed, and instructional quality is top level.

Further, the more the training center or school becomes academic, the less the output fits the employer's needs at the middle level. In the field of technical training this points to a greater use of the facilities of industry, agriculture, and commerce for technical training rather than regarding technical education as a part of the formal system.

It is my conclusion, based on my limited observations and the studied review of the literature, that the present education and training system is ill-adapted to meet this demand for trained manpower. This conclusion, I might add, is also supported by others. Reflecting the imbalances in the relative sizes of the various levels and types of education in favor of academic education and manpower, the nation has an over-supply of general secondary school leavers and university graduates, and a serious shortage of middle level technicians, commercial, and management personnel and skilled workers. The present composition of the labor force is ill-suited to implement the new economic policy.

SHORTAGE  
OF TRAINED  
MANPOWER

The shortage of skilled craftsmen and technicians is so severe that it seriously affects the expansion plans of both the public and private sector. The imbalance between supply and demand is also reflected in wage levels, with skilled craftsmen earning much higher salaries than typical university graduates.

WORKFORCE  
IMBALANCE

The relative abundance of university trained staff and the very low proportion of technicians and skilled craftsmen represent the major imbalance in the Egyptian labor force which must be corrected if present

economic targets are to be achieved. A mass of well-educated, but largely unemployable and unproductive personnel, is burdening the public sector while crucial needs for adequately trained middle-level technical, commercial, and managerial personnel in many sectors of the economy remained unfulfilled.

This disequilibrium is likely to become more serious as a result of the present distribution of enrollments among the various levels and types of education.

Because the share of agricultural employment is likely to continue to decline, and the modernization and industrialization of the urban sector will require increasingly higher skill levels, this drift presents a major challenge to the country's vocational training system.

Aware of this condition, the government has requested financing for a project which would expand, diversify, and upgrade the training of technicians, skilled and semi-skilled workers; the introduction of comprehensive preparatory and secondary schooling on a pilot basis in order to provide more instruction in practical courses; to increase and upgrade the training of technical teachers and workshop instructors; and the improvement of educational and manpower planning.

The various project items are under the administration of the Ministries of Education, Higher Education, Industry and Mineral Resources, and Housing and Reconstruction. As each ministry's project items are independent of the other ministries' items, they may be implemented separately. Therefore, to simplify project management and to place

NEW GOE  
PROJECT  
FRAGMENT-  
ED

responsibility for project implementation directly on each beneficiary, each Ministry (all of which have a well-established machinery for building construction and equipment procurement) would be responsible for the implementation of its own project items. The staff required to supervise project implementation has already been appointed in each Ministry. To be quite candid, I find this decision unfortunate. In my opinion, this will only reinforce the present state of fragmentation.

This fragmentation was not only based on my observations, but supported by the fact that neither I nor Allan Salt was able to find any up-to-date manpower study to support a nationally integrated program. What is needed are precise estimates of future needs derived from earlier manpower studies and various government estimates. Compared with the anticipated outputs of training programs, however, I cannot help but anticipate a magnitude of foreseeable shortages. The manpower demand figures represent the additional numbers required for expansion of various sectors and for the replacement of a portion of the existing stock because of death and retirement. They do not, however, include an allowance for emigration which may adversely affect other plans (e.g. about half of the skilled construction workers would be required by the massive reconstruction and development efforts planned for the Suez Canal Zone.)

- I am suggesting a fundamental methodology which is non-intervening in concept, i.e., the Egyptians become the change agents of their own educational system with respect to the voc-tech program. Their

AID  
PROJECTS  
NON  
INTERVEN-  
ING  
HODOL-

own derived method would provide for an evaluation of the appropriateness of the educational system in responding to GOE developmental needs. Therefore, the USAID program in voc-tech should be primarily facilitative and catalytic. The real designers of the national educational system that would evolve from the suggested methodology would be the users, and the design criteria would be based upon the GOE's unique development needs.

FUTURE  
SCOPE AND  
DIRECTION  
OF  
TECHNICAL  
EDUCATION

It may be appropriate here to raise some questions concerning the scope and direction of the GOE technical educational system. Before the present plans for reform (fragmented as they are) become too crystalized to be reoriented, the following areas are worth exploring. Are the goals which are going to be pursued: a) linked with GOE's manpower needs? b) connected with GOE's economic and social needs? c) related to GOE's national strategy for development? d) essentially the same as or different from those being pursued 15 or 20 years ago? In short, is the educational system integrated with GOE's developmental needs, or is the system participating only indirectly in the developmental process?

There are urgent problems of productivity and modernization of the GOE's workforce resulting from deficits in developed human resources, in the agricultural sector, in the industrial sector, commercial sector, and the public sector. These problems need to be communicated in quantitative and qualitative terms to personnel throughout the educational system so that all individuals make a conscious effort to adapt curricula to these needs.

MANPOWER  
GAPS

A basic assumption of modern manpower planning is that developmental targets, be they economic, social, or national in scope have a corresponding and identifiable occupational structure. An inventory can be made of the present structure and comparisons made between existing human resources both quantitatively and qualitatively, developmental needs and annual output of the educational system both public and private to arrive at some reasonably close estimates of human resources deficits. It would seem that a practical goal of the educational system would be to eliminate current deficits and, at the same time, begin programs whose objectives would be to prevent sizable deficits from developing in the future. One of the reasons for 'manpower gaps' is the absence of any continuing system of dialogue between the demand side of the labor market and the supply side, which in this case is the educational system.

TRAINING  
NEEDS  
ASSESS-  
MENT

Any viable plan to nationally integrate the numerous training programs in technical education must, at the outset, establish a training needs assessment study.

I suggest that the Committee consider the Delphi Method as one appropriate methodology for needs assessment studies for a national voc-tech program.

DELPHI  
METHOD

The Delphi Method is a means of generating input to decision-making from individuals with relevant experience, knowledge, and opinions in some area of concern. Named for the legendary Greek oracle whose advice was sought in ancient times, the Delphi Method is directed towards reconciling different, and often conflicting, opinions into a meaningful consensus that

in turn can be used as a basis for decisions. Key characteristics of the Delphi approach are: (1) anonymity of survey panel members; (2) anonymity of response; (3) multiple inter-actions; (4) statistical analysis of panel response; and (5) controlled feedback of responses to panel members.

Unlike traditional approaches for achieving consensus, the Delphi Method attempts to preserve communication among group members, but eliminates face-to-face confrontation altogether. This reduces the influence of certain psychological factors such as specious persuasion, unwillingness to abandon a publicly expressed opinion, and the bandwagon effect of majority opinion.

As a result of increased experience with Delphi, its original use in forecasting the future has been supplemented by attempts to utilize the method more generally in evaluating current conditions, identifying problems, and establishing goals. Such topics as planning in education, analysis of the environmental impact on highways, and studies in the quality of life have been explored using the Delphi Method. For example, the Delphi Method is beginning to have an impact in health related studies such as the forecasting of innovations in medical care and the determination of health needs and priorities for a community, region, or nation.

Relative to this report, it is significant to point out that the Delphi Method, as a planning tool, was, and is currently, used by the Oklahoma State Department of Vocational Technical Education in determining their future role in the state. The technique was used with 103 persons at the state, local, and national levels who were asked to identify the

factors to consider in determining the future role of vocational and technical education. The results of the three rankings are being used as input in the planning process. Dr. Hopkins indicated to me in a teleconference that the Delphi Method is currently being used by the Oklahoma State Department of Vocational and Technical Education as their primary tool for all their needs assessment studies.

For this reason, one of the first recommendations that I am making is that technical assistance be provided the Committee in training key personnel of the GOE in Delphi methodology. A brief description of Delphi is provided in Attachment # 4.

In designing any program(s) to achieve national technical manpower goals I suggest that foundation in core technical skills is critical. I suggest that the GOE consider the feasibility of establishing Core

CORE  
SKILLS  
TRAINING  
CENTERS

Employment Skills Training Centers (CESTC). See Recommendation #11. These centers should be established principally in business, institutions or other organizations actually planning to employ the trainees. The Centers would train unskilled persons in the necessary skills to equip them for an entry level job with opportunity for lateral and vertical career mobility to the maximum extent possible.

These Centers would need the following in order to operate:

- a. A task analysis of the core skill areas to determine what the core skills are and to provide the specifications to develop skills and performance assessments to measure them.

- b. A set of skill and performance assessments to enable each Center to first design curriculum around the skills and performance necessary to job success and then be able to evaluate the Center success and develop appropriate alternatives if trainees are not achieving success.
- c. The appropriate management structure to account for and be able to allocate and reallocate resources as necessary to insure, to the extent possible, trainee success.
- d. A way and means of determining the motivational characteristics of an individual in order that he will not be placed into a job in which he cannot succeed, or grow as a person, or both.
- e. A procedure for matching people with jobs and restructuring jobs to the extent feasible with resources and organizational mission.

The study should build on the 15 years of experience of the Ministry of Industry and Mineral Resources. As has been mentioned previously, its combination of formal training and apprenticeship system is one in which trainees spend one year in the training center and two years in industry with part-time day release to further their theoretical knowledge of the particular branch of industry in which they are engaged. This leads me to suggest that should such core skill training Centers be established, the Ministry of Industry and Mineral Resources may logically be the place for an initial pilot effort.

How do we move the unskilled to an entry level job?

Through training but not totally on the job as some might propose. Instead it has been found that for clusters of jobs, for example, in the health services field, that there are common skills, knowledges and basic performances that are required of any person who delivers Health Services. There is a strong likelihood that the entire human services area (anyone who provides services to people) have a core of common tasks that must be performed. I suggest that these "core" skills be taught by existing agencies, institutions, businesses, schools, or anyone else who can meet the criteria for certification as a Core Employment Skills Training Center. It is likely and to be encouraged that businesses employing the unskilled that desire to do so may be certified as a CESTC. The core skills necessary to perform each job cluster; e.g., Health Services, Housing, Water Development, Education, Social Services, Agriculture, Construction, Electrical, Family Planning, Nutrition, Mental Health, etc., would be defined through the process of task analysis and specifications drawn and assessments developed to ascertain if an individual possessed these core skills. These core skills tests (assessments) would be performance not knowledge tests and would assess specifically whether in a given setting an individual could perform a certain task.

These tests (assessments) would then provide the specification for the core training programs to be conducted by the certified Centers. Test validity would be established and maintained by a check of actual on-the-job performance of these skills clusters after appropriate OJT was provided to

enable an individual to qualify for the particular job. Individuals having successfully completed the Core Skill Training or the Core Skills would be matched with those who do not have these skills and their performance would be compared in OJT and actual on-the-job performance. Necessary adjustments would be made until the Core Skill Training Assessments results matched on-the-job performance. This validation would be done in certain, selected as typical, CEST Centers across the country.

Training materials and guidelines would be developed to assist a CESTC in conducting the actual training.

Training would be paid for by trainee, business and government. The assessments, training materials and guidelines, CS trainer training, advertising and promotion would be provided at GOE expense; the employer would provide a job for the trainee and provide him with the necessary released time.

Quality control would be maintained by a training audit that would be performed on each Center at least annually. This audit would consist of a paper audit (occasionally performed on site) of number of successful trainees vs. number of unsuccessful trainees - must maintain, e.g., at least a 60% success ratio after deductions for illness, personal emergencies, etc. Or for disadvantaged and unemployable provide subsidies to them as suggested by Center Administration.

To provide every voc-tech school in Egypt with even a minimum of equipment appears to be financially prohibitive. The GOE needs to study the feasibility of utilizing existing community facilities such as libraries, factories, workshops, and municipal buildings to double as training facilities, when these are available in order to provide improved instruction and education services. Another approach, where facilities and educational services are totally inadequate or unavailable, is to construct and equip centralized community oriented learning resources centers to meet the needs of all the voc-tech educational programs for the entire nation.

The search for cost-effective solutions to the centralized learning resources is in my estimation an appropriate area for U.S. AID support. Prior to this however, I suggest that the GOE conduct a prefeasibility study of the voc-tech oriented community based LRC, and explore the services that can be provided as a means to minimize education costs. Following this a more definitive AID financed feasibility study to determine the applicability of the LRC concept can be initiated. This study should build on the GOE study and assess the adequacy of the LRC concept as a problem on a national rather than regional or community basis. The results of this study should then be integrated into the plan for a nationally integrated voc-tech training system.

These Learning Resource Centers (LRC's) may have several forms and functions depending upon the needs of communities, school and population distributions, transportation, the availability of other facilities, the

LEARNING  
RESOURCE  
CENTERS  
FOR  
TECHNICAL  
EDUCATION

imagination of community and educational leaders and the participation of private and public organizations. These LCR's could well serve the Core Skill Training Centers as well as the national requirement for literacy training.

Inasmuch as literacy training has had relatively little success in Egypt and a determined effort to eradicate adult illiteracy would be highly expensive, the potential for literacy training through the LRC deserves serious consideration. The effort by the GOE to dry up the source of illiterates by ensuring that all children complete primary education is not likely to produce significant results in the foreseeable future. Attachment #5 provides some suggested guidelines for the pre-feasibility study.

A variety of efforts must converge into a nationally integrated program. I suggest, however, that these efforts be concurrent ones while a national plan is being developed.

In my recommendations I am suggesting that a USAID supported project be initiated as soon as possible to develop a foundation for the selection, evaluation, adaption, design and development of validated self-instructional learning materials in both print and non-print format for voc-tech education at all levels. (Refer to Recommendations 1.3, 2, 3, 4, and 5.)

The approach proposed to develop such units and materials is based on a series of activities, all aimed at providing the national program for technical education with validated learner-oriented learning materials as well as a training plan, management, and evaluation system genuinely responsive to the training needs of learners. Training should also be

INVENTORY  
OF  
VALIDATED  
LEARNING  
MATERIALS

provided to personnel who will be responsible for administering the materials as well as using, continuously updating and evaluating them.

This may sound self-serving, but I have been philosophically and methodology wedded to the ISP. My thinking is axiomatic in this context. Recognizing this bias of mine, I still recommend that the Instructional Systems Process (ISP) be the basic methodology utilized in developing the learning materials for the voc-tech educational training programs. It should be emphasized, however, that no ISP will be useful unless it is preceded by a thorough and accurate training needs assessment, coupled with a complete identification of training resources needed to support the training and education program. (Refer to Attachment #3 for an outline of the ISP process.)

It is my understanding that there was serious consideration given a year or two ago to a new practical, work oriented curriculum which took into account rural-urban and regional differences. Apparently, the deficiency in educational materials and equipment was known in general terms and recent efforts have been made to estimate the magnitude of the problem. I was advised that a study was already underway and scheduled for completion last year (1976). This study was to provide data on the status of instructional materials throughout the country. I could not locate the study. This study, if available, should be used to plan for and provide better crafted learning materials and equipment in areas where they are most needed.

CORE-  
NATIONAL  
ED.-TECH.  
TRAINING  
CENTER

In order to provide a foundation for the competency-based teacher training program in technical education fully utilizing the instructional systems technology approach, I am suggesting that a core Education Technology Training Center Staff (ETTC) should be developed (refer to introductory statement of Recommendations section as well as to Recommendation #8). This should be done as soon as possible. I have no suggestions to make at this time as to where in the rubric of the fragmented system this core staff should be housed, or by which agency it should be administered. If I were to be forced to make a choice at this point, I would certainly not suggest that it be an arm of the Ministry of Education. Eventually, it should be merged within a central staff (which optimistically speaking, may be organized within the next two to three years) to administer a national vocational-technical training system for meeting national manpower requirements.

A critical requirement exists to train training personnel in quality control procedures for course development or revisions in the curricula presently offered in the vocational-technical courses.

These procedures establish the criteria, scope, responsibility and priorities for national, regional and local quality control programs by determining that:

TRAINING IN  
QUALITY  
CONTROL

- a. Course objectives in vocational education are being achieved by course graduates.
- b. Specified objectives reflect current qualitative requirements of using governmental agencies and industries.
- c. Training capability under current and anticipated requirements is being maintained.
- d. Training processes are accomplished and supported in the most effective manner within operational and budgetary limitations.

The training situation includes not only the organizations which provide instruction, but also the organizations that provide staff assistance and support required to maintain training. All organizations (in addition to those which provide instruction) that support training or provide staff assistance will participate in evaluation projects designed to determine the training effectiveness and the efficiency of their staff. It is difficult for me to understand how this can be achieved without the establishment of national technical education system.

I am suggesting that technical assistance be provided to train 3-4 key persons in managing the quality control program for each course of instruction, including the primary responsibility for the development of evaluation plans for each course as well

as the conduct of evaluation projects which determine field qualitative requirements and validate course training objectives against these requirements.

In addition, technical assistance is needed to train personnel in conducting quality control projects on a sampling basis to determine the quality of course training objectives and the extent to which instruction helps the trainee achieve these objectives.

The technical assistance will also provide training in evaluation techniques. Training evaluation to be effective requires specific criteria by which training processes, training relevancy, and graduate performance can be evaluated. These criteria must pertain to the processes by which courses of instruction are designed and conducted as well as to the extent of trainee achievement. A quality control program operates continuously to insure that the application of the preceding four principles are effective and efficient in the production of proficient graduates.

#### IV. RECOMMENDATIONS

I was unable to determine the extent to which key personnel need training in such fields as manpower needs assessment, job performance analysis, and programming.

Initially, I suggest that key administrative and technical personnel should be provided with opportunities for observation tours, attendance at seminars, and workshops at technical institutes and/or other agencies or institutions both in the United States and in other countries in order to develop a technical-professional program for middle-level technicians to meet national manpower needs and job training requirements.

I further suggest that a central core of teachers in voc-tech be provided with training in competency-based educational practices through workshops, seminars, and other appropriate activities for the priority fields of industry and applied technology. They also should be trained in the remodeling of present courses according to the principles of competency-based education adapting, where appropriate, printed and other types of educational materials. Competency-based education programs are those programs in which the competencies to be acquired by the student and the criteria to be applied in assessing the competency of the student are made explicit, and the student is held accountable for meeting these criteria. Competencies are those attitudes, knowledge, skills, and behaviors of a student which enable him to demonstrate his optimum proficiency in a specific

vocation. Competencies are generally specified in behavioral objectives format. Measures of the objectives are criterion- rather than norm-referenced.

Finally, the vocational-technical training staff should be provided with technical assistance for the design and effective utilization of learning resource centers for the adequate implementation of individualized industrial education and training.

Recommendation # 1.

It is recommended that the following studies be undertaken concurrently within the next nine months.

1. To determine the feasibility of the GOE intergrating vocational/ industrial/technical education into one system. The study should delineate the mechanisms to be used in accomplishing this if it is determined that such a plan is feasible. Estimated cost: \$6,000.
2. To determine the mechanisms required to enable the GOE to have its presently fragmented and dispersed vocational/technical education and training programs become relevant to national manpower needs and job training requirements. Estimated cost: \$6,000.
3. To develop a plan for determining educational and training materials requirements, and relating these requirements to the acquisition and modification of both print and non-print materials in vocational/ technical centers. Estimated cost: \$6,000.
4. To plan and design a coordinated research, development, and production program for vocational/technical education for the GOE. Estimated cost \$6,000.

Recommendation # 2.

Establish a program to implement a replicable and adaptive instructional systems technology-based instructor training program.

Recommendation # 3.

Remodel present courses of instruction according to the principles of  
based education, adapting where appropriate printed and other

Recommendation # 4.

Train personnel to design and effectively utilize learning resource centers for the adequate implementation of individualized industrial education:

Recommendation # 5.

To develop and introduce a functional program for the training of instructional staff in the latest proven instructional systems, methodologies, technical cooperation, and training both long and short term. This will include workshops and seminars in:

- (1) Organization and staff training
- (2) Development of training programs
- (3) Curriculum evaluation
- (4) Program design for upgrading in-service educators
- (5) Professional guidance
- (6) Development of a system to aid in graduate placement and to get information concerning the results to them.

Recommendation # 6.

To develop a cost-effective audio-visual and training aids delivery system.

Recommendation #7.

To develop a media technician training program for students in the vocational-technical schools so that graduates of the program are able to develop and maintain audio-visual equipment and training aids.

Recommendation #8.

As early as possible, a core Education Technology Training Center Staff (ETTC) should be selected, and curriculum design for the ETTC should be developed.

Recommendation #9.

Key personnel who are selected to initially staff the educational technology training center staff should be provided with training in quality control procedures and curriculum development and the management of training programs.

Recommendation #10.

As many as five key personnel representing the Ministries of Education, Housing and Construction, Social Affairs, Agriculture, and Industry and Mineral Resources should be trained in using the Delphi Technique.

Recommendation #11.

A pre-feasibility study should be supported by USAID to consider the establishment of a national network of core skill training centers.

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Agencies

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Ministry of Higher Education  
Ministry of Manpower  
Ministry of Health  
Ministry of Industry  
Ministry of Housing and Reconstruction  
Ministry of Social Services  
Federation of Egyptian Industries  
Audio-Visual Center for the Director of Health Education

Schools

Guisa Agricultural School  
Technical Teacher Training Institute  
Kasr El Any School (Experimental Technical School of Commerce)  
Instructory Training Institute, Amiria  
Zainel Abedin School.

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### ATTACHMENT #3

#### THE INSTRUCTIONAL SYSTEMS PROCESS

The Instructional Systems methodology is a deliberate and orderly process for planning and developing instructional materials which insure that persons using the materials are taught the knowledge, skills, and attitudes essential for adequate performance in a specific vocational-technical subject areas.

- (1) *Develop Performance Requirements (PRs)*. The process of determining the tasks required of the human component, and the standard of performance. This process applies to all types of "activities." It results in a statement of all human activities (skills, knowledge, and attitudes) required for successful performance in a particular area.
- (2) *Determine Learning Requirements (LRs)*. The process of determining the changes needed in skills, knowledge, and attitudes of people, so they can perform adequately in a specific area. For example, given economic and other constraints present in a particular country or village, can mothers prepare an adequate diet for the family? These changes, when added to the entering repertoire of abilities, must meet the performance requirements.
- (3) *Determine Criterion Objectives*. The process of specifying the objectives which the trainee must meet to satisfy the training requirements. Criterion objectives specify precisely what behavior is to be exhibited, the conditions under which behavior will be accomplished, and the minimum standard of acceptable performance.

- (4) *Develop Criterion-Referenced Tests.* The process of developing and administering tests which directly measure the criterion objectives. The survey test is administered to samples of prospective trainees. Very often in developing countries, there will rarely be paper and pencil tests. The purpose of these tests is to verify which skills and knowledge to include in the instructional materials. Criterion-referenced tests are also used to determine if the behaviors in the criterion objectives have already been acquired.
- (5) *Select Media/Methods.* The process of selecting appropriate media and methods for each message unit or set of instructional materials. Selection is based on:
- Practical constraints (Such as financial considerations);
  - Instructional nature of the objectives (certain behaviors may be important in learning other objectives, but not directly relevant to the performance required in every day living experience);
  - Presentation mode implied by the objectives (visual, auditory);
  - Presentation mode implied by the assessment of the trainee;
  - Type of learning involved (for example, simple visual discrimination; chain of skilled performances);
  - Best instructional sequence for the objectives;
  - Cost-effective considerations.

- (6) *Develop and Print Instructional Materials.* The process of developing and integrating the actual materials which make up the instructional program.
- (7) *Validate and Revise Instructional Materials.* The process by which each message unit is tested (validated) as it is developed. This process insures that the criterion objectives are satisfied. First, materials are tested on several individuals and revised as necessary. Then, they are tried out on small groups, carefully sampled from the potential target population. Final revisions are made.
- (8) *Present Instructional Materials.* The process of implementing and administering the instructional materials program. This includes training of instructors and presenters, as the case may be, and scheduling, as well as the actual conduct of the program.
- (9) *Evaluate Instructional Program.* The process of determining the extent to which trainees who have worked with the instructional materials satisfy the performance requirements in real life. Detailed records of performance are kept, and changes to the instructional materials are recommended as necessary.

In addition to the above nine steps, a critical component that we will be adding between steps Four and Five but which will run

concurrently with steps One through Four will be the diagnostic analysis of user entry level competencies and understandings of the task to be performed. Therefore, the materials in certain cases need to be modular in form and adaptive to the idiosyncratic learning requirements for each target group.

## BRIEF DESCRIPTION OF THE DELPHI PROCESS

The Delphi Method is a means of generating input to decision-making from individuals with relevant experience, knowledge, and opinions in some area of concern. Named for the legendary Greek oracle whose advice was sought in ancient times, the Delphi Method is directed towards reconciling different, and often conflicting, opinions into a meaningful consensus that in turn can be used as a basis for decisions.

The notion of seeking informed advice on issues is not new. Roundtable discussions, committee meetings, and public forums have been used extensively in seeking to achieve a consensus for planning future actions.

In Delphi, group meetings are replaced by a carefully designed opinion questionnaire that is recirculated to the participants over and over again. In each successive round, the questionnaire contains additional information about the various responses from earlier rounds, the reasons for those responses, and the degree of consensus which has been achieved at that point. Thus, the participants communicate with each other through the information contained in each successive questionnaire. This systematic feedback stimulates those involved in the process to consider points which they had previously neglected, or to reevaluate factors which they had initially considered of greater or lesser importance. In general, the process of inquiry and feedback stops when consensus on the issues had been approached or achieved among the participants, or when it becomes apparent that two or more distinct schools of thought have delineated themselves so that no single consensus on the issue is possible.

The Delphi Method initially was developed by Olaf Helmer of the RAND Corporation in conjunction with Norman Dalkey of Douglas Aircraft. It was first applied in a major long range forecasting study for the U.S. Department of Defense

Early uses of Delphi were limited to the long range forecasting of technological change. This type of study involved the two attributes which established the critical characteristics of the Delphi Method. First, long range forecasting required the opinion of experts; that is, there were no facts on the future, only opinion. Since no one person's estimates held any unique validity, a synthesis of the opinions of many was sought. Second, technological forecasts were virtually always expressible in numerical terms (e.g., tons, percentage of growth, percentage of probability). As a result, the method relies on information that can be expressed as numbers.

The Delphi mobilizes and directs expert thinking about the future in a multi-round process aimed at achieving accuracy of prediction, while allowing for the subjectivity of future-thinking. "This technique replaces direct debate by a carefully designed program of sequential individual inter-relations (best conducted by questionnaire) interspersed with information and opinion feedback.... from earlier parts of the program." (Helmer and Rescher, 1959.)

Use of the Delphi Method soon spread to many other "inexact areas" such as the study of political alliances and forecasting economic trends. A new attitude toward the future became apparent in all types of planning agencies. Haphazard gambles were not enough anymore. The need for better planning tools led to increased experimentation with and use of the Delphi Method. In validating the use of this method, three different points have been supported, and are as follows:

1. Where answers can be checked against reality (asking people to estimate facts for which they have no exact information), it is found that the responses, in their move toward consensus, tend to approach the actual value sought.

2. Controlled feedback, compared to face-to-face discussion, improves the accuracy of group estimates.

3. Delphi procedures are appropriate for processing "value Material" (e.g., how good or bad something is) as well as "fact material," (e.g., will a particular event occur).

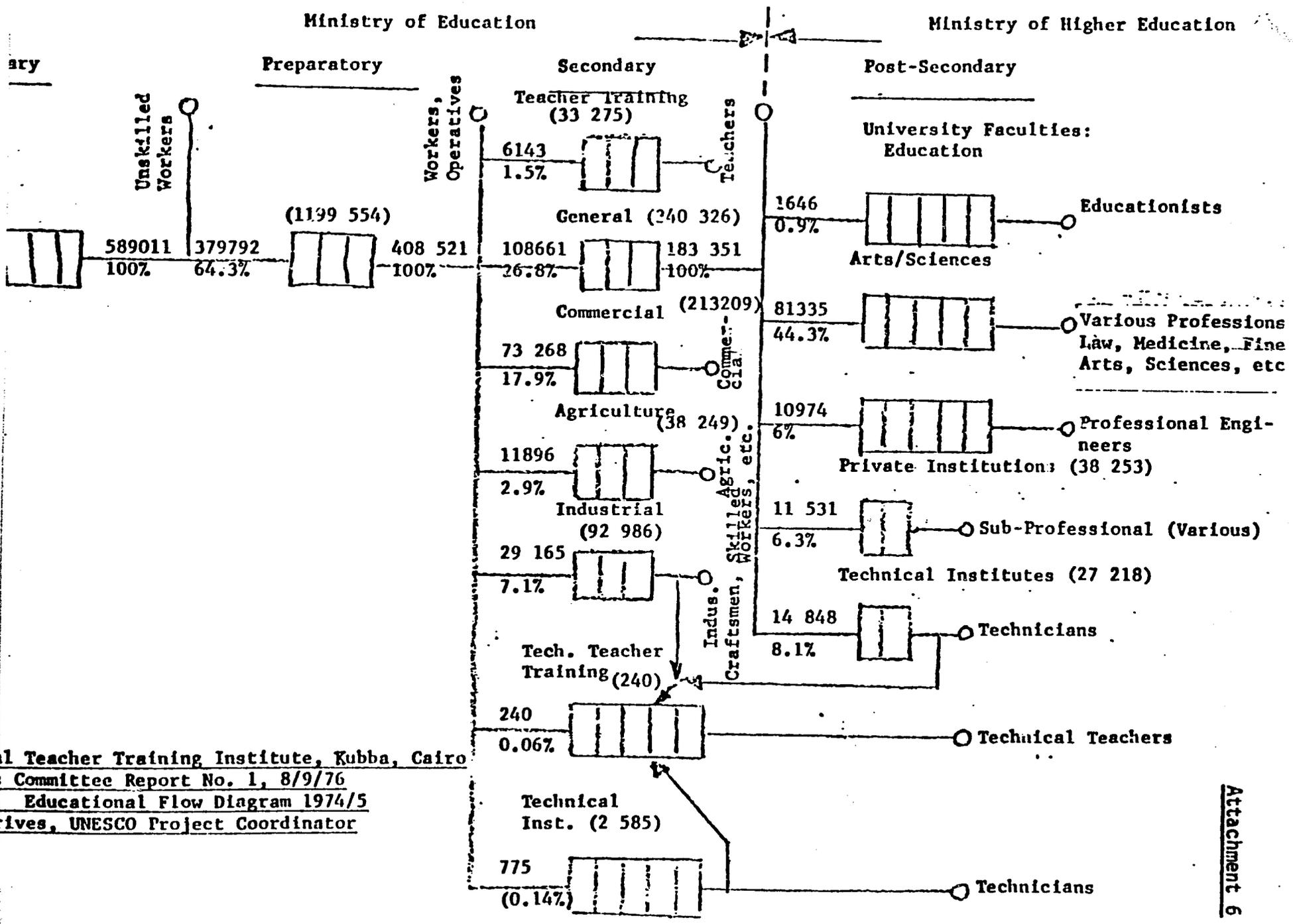
The Delphi Technique prevents any one member of the panel from unduly influencing the responses of other panel members. Through the statistical summaries and minority report, panel members communicate with each other, but only in a limited, goal-centered manner. The systematic control lends an air of objectivity to the outcome, which provides a sharing of responsibility that is reassuring and releases the participants from group inhibition. This quality was demonstrated as a result of a series of experiments initiated at RAND Corporation to evaluate the Delphi procedure. Upper class and graduate students were used as subjects, and general information of the almanac type as subject matter. The two basic issues examined were: (1) a comparison of face-to-face discussion with the controlled feedback interaction, and (2) a thorough evaluation of controlled feedback as a technique of improving group estimates. The results indicated that face-to-face discussion tended to make the group estimates less accurate, whereas, the anonymous controlled feedback made the group estimates more accurate. Other results include: (1) the insight gained into the nature of the group information processes, and (2) the fact that a meaningful estimate of the accuracy of a group responsive to a given question can be obtained by combining individual self-ratings of competence on that question into a group rating.

Although the method was originally a tool for technological forecasting, Weaver points out that:

. . . promising educational value appears to be a method for studying the process of thinking about the future . . . a teaching tool that forces people to think about the future in a more complex way, and a planning tool that could aid in probing priorities held by members and constituencies of an organization. (\*)

For further information regarding Delphi it is suggested that readers refer to Weaver's report.

(\*) Timothy Weaver, Delphi, A Critical Review. A Research Report  
(Syracuse, N.Y.: Syracuse University Corporation, 1972.)



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 Committee Report No. 1, 8/9/76  
 Educational Flow Diagram 1974/5  
 Director, UNESCO Project Coordinator

Attachment 6