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About the Training of Computing Techniques Specialists in the Polish People's Republic*

I. INTRODUCTION

Towards the end of 1970 over 7 000 specialists worked in the Polish People's Republic in the field of computing techniques.

The Ministry of Higher and Secondary Education provides the main basis for training the personnel with secondary and higher education. Nevertheless, in connection with the fast rate of introducing computing techniques, with a view to satisfying the ever increasing usual needs of such techniques, it was necessary to also use another type of training, i.e. with the help of specialization lectures. This form proved particularly useful in the beginning period of the years 1966—1970. A specific problem of the present time — the insufficient number of experts mainly in such fields as designing of electronic data processing systems, programmers and experts on particular problems is solved, in our country, to a great extent, through specialization courses of lectures.

The organizers of this type of training are the Computing Centre, grouped within the State Computing Centres System — ZETO, the Centre for Extending the Training of Managing Personnel, and, quite recently, such organizations as the Central Technical Organization — NOT, the Polish Economists Union, a.s.o.

During the 1966—1970 period, the Ministry of Higher and Secondary Education adopted measures with a view to creating conditions which would allow the increase of the number of computing techniques specialists, as well as the raising of their training level. The training on certain particular problems, which are not directly connected with the computation techniques, was organized within the educational system, in other faculties of the Higher Educational Institutions. The specific features of this training requires to precisely set down the needs in this particular training field, taking into

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account the necessity of being ahead by several years as against the scheduled results, and of correspondingly provide this training, both with the necessary teaching staff, and with computers for a continuously increasing number of students.

Despite the relatively high difficulties which appeared to be particularly marked in the beginning period of the years 1966—1970, the educational system — as a consistent achievement of the training process within the higher educational institutions or in the form of post-universitary education — ensured the permanent increase of the number of experts in computation techniques. More than 1000 such experts graduated, from higher or secondary schools, only in 1970.

In 1970, the computation techniques specialists were trained in 15 higher schools and in 12 secondary schools, in the Polish People's Republic. Taking into account the experience of preceding years, the increase in number of the teaching staff, the increasing of the available computers, the Ministry of Higher and Secondary Education works out presently educational plans on a wider scale than before. Training in the field of computation techniques is planned to include all higher educational institutions and to correspondingly amplify the secondary school programs. As a matter of fact, it is still necessary to take into account the fact that, depending on the particular faculty and speciality, programs must be differentiated.

The increasing number of personnel, as a result of the higher number of graduates from training schools and courses of lectures, in the period 1966—1970, goes to a great extent ahead of the increasing computer stock in our country.

This fact, considered as being temporary, is a positive one, though the relatively low number of computers hinders the adequate extending of young specialists qualification. At present, a relatively low number of specialists in computation techniques work directly with digital computers, and their majority consists of experts on particular problems, dealing with programming and working-out of electronic data processing systems. These works usually begin two years ahead of installing the computers. This is why there is a permanent and ever increasing demand for specialized personnel.

Planning the necessary personnel for the computation techniques is a complex problem. It is closely connected to the increasing number of operating computers, to being familiar with data processing equipments, to the settling down of the number of various specialities, according to the practised function within the data processing, to the orientation of specialists training, a.s.o.

It is considered that, most generally, computing techniques experts, working in the field of data processing with the help of computers, can be divided into three main groups:

A. personnel specialized in hardware;

B. personnel specialized in software and hardware;

C. personnel specialized in particular software problems.

Denominations adopted in the Polish People's Republic, for the professions of experts in computing techniques, are:

In group A

— electronic computer operator;
— electronics engineer and technicist (technical exploitation of computers);

In group B

— computer programmer;
— mathematician specialized in the "digital techniques";

In group C

— designer (programmer-organizer) of data processing systems;
— mathematician-programmer (software problems);
— designer of production-process automatic control systems.

In accordance with our considerations, as was allready mentioned, planning of the increase of personnel number in the field of computation techniques is determined, on the one hand, by the number of computers actually in operation, and, on the other hand, by the problems connected with the working out of real data-processing systems.

It is essential to correctly estimate the number of trained personnel intended to real data-processing systems, an estimate to be affected on the basis of their labour amount. This is particularly important in Poland, where experience in the field of automatic data processing and of introducing systems is relatively limited. Consequently, when planning development of trained personnel during the next five-year period, the number of specialists is settled down for each of the six education fields in Poland, related to one conventional data-processing computer, which is the computer worked out in Poland — ODRA-1304 —, or the Soviet computer Minsk-32. The conventional computing machine, for solving technical-scientific problems, is considered the ODRA-1204 computer. In these conditions, the number of specialists for one electronic computer is shown in the table which follows:

Crt. nr.	Speciality denomination	For data processing	For technical-scientific computations
1	Data processing systems designer	12	—
2	Mathematician specialist in «digital techniques»	4	6
3	Electronics engineer, specialist in computers	2	1
4	Technicist programmer	9	4
5	Electronics technicist, specialist in computers	2	2
6	Electromechanical technicist specialist in «digital computers peripheral units»	4	1
	TOTAL	33	14

The personnel for the computation techniques are trained in numerou higher and secondary schools. Data processing systems designers are traine in the respective faculties and by post-universitary courses of lectures, i the following higher educational institutions:

— Central Planning and Statistics School, in Warsaw;
— Economics Institute, in Poznan;
— Economic Institute, in Wroclaw;
— Polytechnic Institute, in Warsaw
— Polytechnic Institute in Poznan
— Polytechnic Institute, in Szczeczin.

Mathematicians specialized in «digital techniques» are trained in th Mathematics Institute of the seven universities, in Warsaw, Crakow, Silesia Wroclaw, Lodz, Liublin and Forun.

Electronics engineers, specialists in computers, are trained in the Mathe matical Machines Institute of the Faculty of Mathematics, in the Warsa Polytechnic Institute, as well as in Technical Cybernetics Institute of th Wroclaw Polytechnic Institute.

Electronics technicists, specialists in digital computers, are trained i two-year schools, the so-called state technical schools, intended for graduate from general-education secondary schools. These schools are situated in Cra kow, Lodz and Wroclaw.

Technicists-programmers are trained in the Warsaw state technica school, as well as in economics schools in Katowice, Crakow, Lodz, Poznar and Wroclaw.

Electromechanical technicists, specialists in "digital computers periphe ral units" are trained in the state technical schools in Warsaw and Wroclaw

It results, from this enumeration, that in the Polish People's Republic education is carried out in all the six directions. Still, the fast developmen of this field, both in the direction of using and in the direction of satisfyin the needs of production of digital computers, requires the increasing develop ment of the higher and secondary specialization education.

According to preliminary estimates, the need for personnel specialize in computing techniques will grow particularly fast, beginning with 1973 It would be necessary to double the number of higher and secondary schoo graduates, in order to get a sufficient number of specialists. This problen cannot be solved by creating new schools and faculties, as this is connecte to a corresponding utilization of the laboratories, as well as to the compute stock. An important deficiency is represented by the lack of trained teachin staff.

The problem of training personnel for the needs of the computing techni ques is, as a matter of fact, very complex, as can be seen from this shor report. It must be solved, despite all difficulties. The fraternal cooperatio between socialist countries, the consultations and the sharing of experienc may, to a great extent, alleviate these difficulties, and may lead to the expec ted results.

CONCERNANT LA PRÉPARATION DES SPÉCIALISTES DANS LA TECHNIQUE DE CALCUL EN POLOGNE

L'auteur expose le problème de la préparation des cadres professionnels pour les nécessités de la technique de calcul en Pologne. La préparation est faite au moyen des cours de spécialisation sous l'égide du Ministère de l'Instruction supérieure et moycnne. Les organisateurs de ces cours sont les centres de calcul, compris dans le système d'Etat des centres de calcul — ZETO, l'Organisation technique centrale — NOT, l'Union Polonaise des economistes, etc. Le nouveau système d'enseignement supérieur ou l'enseignement postuniversitaire a assuré l'augmentation continuelle du nombre des spécialistes dans la technique de calcul.

La planification du nécessaire de cadres professionnels pour la technique de calcul est un problème complexe, en relation étroite avec l'augmentation du nombre des ordinateurs mis en usage, avec la connaissance des équipements pour le traitement des informations, avec l'établissement du nombre de diverses spécialités conformément aux fonctions exercées dans le processus de traitement des données, avec l'orientation de la préparation des spécialistes.

Le développement rapide de la technique de calcul, tant dans la direction de l'utilisation que dans celle de la satisfaction des nécessités de la production des calculateurs digitaux requiert le développement continuel de l'enseignement de spécialité, moyen et supérieur.

ОБ ОБУЧЕНИИ В ОБЛАСТИ ВЫЧИСЛИТЕЛЬНОЙ ТЕХНИКИ В ПОЛЬСКОЙ НАРОДНОЙ РЕСПУБЛИКЕ

Автор излагает вопрос подготовки кадров для нужд вычислительной техники в ПНР. Подготовка этих кадров осуществляется на курсах специализации под руководством Министерства высшего и среднего образования. Организаторами обучения на этих курсах являются центры расчета, сосредоточенные в государственной системе центров расчета — «Зето», Центральная техническая организация НОТ, Польское объединение экономистов и т.д. Новая система высшего и последипломного образования обеспечивает дальнейший рост численности специалистов в области вычислительной техники.

Планирование потребности в кадрах для вычислительной техники представляет собой комплексный вопрос, тесно связанный с ростом числа находящихся в эксплуатации калькуляторов, со знанием оборудования для переработки информации, с установлением числа различных специальностей в соответствии с функцией, выполняемой в процессе переработки данных, с направлением обучения специалистов. Быстрое развитие вычислительной техники как в отношении применения, так и в отношении удовлетворения потребностей производства электронных цифровых машин требует дальнейшего развития специального среднего и высшего образования.