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THE IMPACT OF INFORMATION TECHNOLOGIES IN
EASTERN EUROPEAN UNIVERSITIES

by

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1 Introduction

1.1 Aims. The paper deals with the new information technologies in the universities of Eastern Europe. It describes the "state of art" according to available statistical data. It also tries to analyze the tremendous changes caused by the new information technologies and the limitation of their impact on the traditional university systems. The paper gives therefore a social analysis of information technologies on higher education.

The ration of the social analysis is the following. The growing importance of higher education becomes evident all over the world. It is also evident in the East European region. The global process that embraces higher education all over the world is expansion. Every higher education is expanding today. They expand under different conditions - political systems, cultural traditions, economic conditions, demographic trends. Higher education expansion is a policy answer to the growing demands for schooling at the higher level. There are various explanations for the growth of schooling demands - historical, economic, political, cultural, demographic, social and regional. In any case though politics is forced to meet those demands by supplying more and more spaces in their higher education system. The mutual growth of demand and supply create therefore the phenomenon which is usually described as educational expansion.

Information technologies are taken as a possible answer to the challenge of educational expansion. Information technologies make impacts on higher education if they offer alternative solutions to the educational expansion. Usually, information technologies are viewed as alternative ways to the teaching-learning process. It is argued that they make real impacts only if they are applicable to an alternative system of higher education. Information technologies are revolutionary in Eastern Europe in the sense that they help to create the new system of post-compulsory and tertiary education.

1.2 Sources. The information of this paper comes from two main sources.

(a) The analysis of educational expansion relies on the recent results of higher education research during the 1980s and early 1990s.

The phenomenon has been analyzed by John Meyer and his team at Stanford University (Meyer et al 1979, Meyer 1980). After more than ten years of data gathering and analysis the Stanford group developed a theory of globalization which has the power to explain education development as the process of a system with limited autonomy (Meyer 1992). Following the Stanford group, John Craig presented and analyzed a series of educational statistics covering a whole century of development from the Scandinavian region. He showed the process of educational expansion as an integrated element of what Meyer calls "globalization" process.

Margaret Archer points out the stages of educational expansion in higher education in a comparative perspective (Archer 1972, 1982). As far as East-Central Europe and Hungary respectively is concerned, the process of expansion has been described as early as the turn of the 1960s and 1970s by researchers like Janos Timar and Janos Kovacs (Kovacs, Timar 1971). Following their views and statistical analyses, Jozsef Nagy gathered impressive data on educational expansion in Hungary and referred to the logistic pattern of educational growth (Nagy 1970). His analysis has been followed by Katalin R Forray and the author of the present paper showing the regional patterns of educational expansion (Forray, Kozma 1992).

b) The analysis of the new information technologies comes basically from a pool of data and case studies published by *Educatio*, the quarterly review of the Hungarian Institute for Educational Research (Budapest, Hungary).

Those materials have been reviewed and completed by a background report of I. Radacsi (1997). He develops the statement that information technologies are hardly applicable to the present systems of higher education in Eastern Europe. He makes a parallel between the information technologies of the 1960s and the 1990s and states that the technological revolution of the 1960s failed in the school because of the traditional system of education. It might also happen to the information revolution of the 1990s. So the main task is not to introduce information technologies to the system, rather to restructure the system in a way to be able to absorb the new technologies. Radacsi argues for the development of the post-compulsory and tertiary education as a necessary part of higher education besides traditional universities.

1.3 Key Concepts. There are three concepts (expressions) that ought to be clarified beforehand. They create the core of the present paper.

(a) *The new information technologies (infotec)*. The concept and the connected expressions will be used here as M. Alonso (1995: 3-4) suggests. He writes:

"For the last two decades a new stage in information technology or *infotec* has been taking place, that is reaching explosive or revolutionary proportions. I like to call it the quantum electronics stage because although modern *infotec* is an extraordinary combination of old and new technologies, it depends critically on the quantum behavior of electrons and photons in some materials, such as semiconductors and lasers... This brief overview of some of the major scientific developments, that have occurred over a short period of time, shows how the revolution in information technology that we are witnessing has been possible, allowing the manipulation of vast amounts of information in proportions never imagined before, facilitating the communication among peoples from all over the world, and changing the way they live, work, learn, function, even think... It is having a profound and global cultural impact."

(b) *Post-compulsory, tertiary and higher education: the third level of the system.* System specialists use to differentiate among first, second and third levels of a given educational system. At the first level, pre-school (preprimary) education and primary (elementary) education is organized. The second level means lower secondary education (junior high school) as well as upper secondary education (senior high school, general education upper level). The third level is still unclear. Traditionally, university education was organized at this level. Later, several forms of academic and professional education have also been organized. Today however, vocational education and training is getting to be organized at the third level. It means that professional education and vocational training requires graduation from the secondary schools. In the developed systems where first and second level education is becoming compulsory, the general concept for the third level is post-compulsory (or post-secondary, in the literature of the 1980s). The expression *tertiary* refers mostly to third level education (the university and the non-university sector). The expression post-compulsory will be used to refer to every forms of education (including non-formal trainings and extramural learnings) that requires graduation from the compulsory education. The paper argues that educational expansion, starting today in Eastern Europe, will either exceed university structures or will ruin them.

(c) *Eastern Europe.* The eastern part of the European Continent is always in question. After WW II it has been identified with the parts of Europe under Soviet influence. After the political transition of 1989-90 it became identical with the newly liberated countries. Because of the fifty years behind iron curtains (in more or less rigid ways), there is still less information about the economic, social, political and cultural processes in those countries. One process that attracted international interest toward this part of the Continent is the war and peace process in former Yugoslavia (Bosnia-Herzegovine). There is still little knowledge about the differences among the areas and territories of the region. International politics usually underestimate (national politics however overestimates) the influences of traditions, including differences in religions, origins, languages as well as historic and folkloric heritages. The present paper uses the concept of Eastern Europe to refer to the former countries under Soviet influences (the newly liberated or "reform" states).

1.4 The Structure of the Presentation. The paper is divided into two parts.

(a) The first part deals with the educational expansion in Eastern Europe. It describes the forms and the history of the expansion and applies models for explanation. Educational expansion is viewed as a challenge of higher education systems in Eastern Europe and the question is how to meet this challenge by educational policies and the politicians.

(b) The second part gives an overview of *infotec* in Eastern Europe with a special reference to the university. It takes the new technology as a possible answer to the challenge described and show the conditions under which *infotec* might become a real answer to the challenge of educational expansion.

The message is that *infotec can make influence to the higher education in Eastern Europe only if university structure changes*. The paper suggests that post-compulsory and tertiary education rather than traditional universities can absorb new information technologies in the region and can make a revolutionary use of it.

2 Educational Expansion: The Challenge

This section deals with the expansion of higher education. The expansion is a double sided process created by (a) the growing demands for education and training and (b) the expanding supply of schooling. The growing demand for education is taken as a social phenomenon and is explained as a characteristic change in the behaviors of the parent-student society. A theoretical model is developed to analyze the relevant statistical data of the phenomenon. The expanding supply is understood as a political action by which governments and other actors in the educational arena meet the demand of a given society. Since the demands are different according to the different developments of Western and Eastern societies, alternative policies are suggested to meet alternative demands.

2.1 Educational Expansion - Described and Explained. Expansion in higher education is a step in the expansion of the entire system. One cannot understand the *expansion* of the system without knowing the *social demand* for schooling. The demands of the given societies take education (schooling) as a *consumption good*. Higher education expansion can be explained by the story of educational expansion first at the elementary and later at the secondary level. Craig (1989-90) collected statistics of several European education systems' growth. A comparison of the data shows a characteristic pattern. It is the growth of enrollment in every system accompanied by the expansions of the educational institutions.

"Educational expansion" was the leading policy of the 1970s and 1980s. It was the period of "great expectations and mixed performances" (Cerych and Sabatini 1986). In his classics, Martin Trow (1974) set up a pattern of "massification in (higher) education". The "retrenchment" (Frackmann 1988, Acherman 1988) that followed the expansionist decades was named as a "period of consolidation" (Neave 1985).

Figure 1 represents the pattern of the growing demand and supply of some European educational systems. It shows that (a) at a certain point, various systems embrace different percents of an age cohort from the given society; and therefore (b) the mass education is reached at different time points. Yet, a closer look at the various curves shows background similarities. Educational expansion at every level follows the same pattern. It seems that the European type education, irrespective of its level and the country's educational system, follows the same expansion.

Figure 1: The expansion of secondary education, 1940-80

All curves have the same shape (*S-curve* with a period of stagnation interrupted by the first point of inflexion, followed by a period of rapid growth, finished by a second point of inflexion and a new period of stagnation). The *S-curve* is always the representation of a special pattern of dissemination where the initial phase is slow and after a rapid change dissemination is stagnating at a higher level. The changing social behavior of schooling can always be described according to this pattern. (*Figure 2* is a representation of the growing demand and the expansion of secondary education in one Eastern European country, Hungary.)

The unusual character of educational expansion comes from the fact that the top level of demand and supply at one stage is the initial level of growing demand and supply at a coming stage. E.g. reaching the top level of elementary schooling in a society is the condition for the growing demand for secondary schooling, though at a stagnating period. The *S-curve*, therefore, can be used not only as a representation for expansion at elementary or secondary education but also as a representation of the sequences by which stages of schooling are preparing each other. Mass elementary schooling is a condition for the growing demand for secondary schooling; and universal secondary schooling creates the growing interest for higher learning.

Figure 2: The expansion of secondary education, Hungary 1955-90

There are various explanations for the similarities. I list explanations which concentrate on parents' and students' social behaviors.

- (a) Educational expansion has been an element of the reconstruction of the national economies after WW II. Rapid growth in production is followed by rapid growth of consumption, partly the consumption of "educational goods".
- (b) Educational expansion has been the outcome of the democratization in the educational systems after the war and especially at the turn of the 1950s and 1960s. Demand and supply have mutually been perpetuated by each other. A growing supply initiated a growing demand and *vice versa*. In some countries it was accompanied by growing birth rate after the war.
- (c) Educational expansion has been a reaction to the growing youth unemployment at the end of the 1950s and the beginning of the 1960s. It was the time of the structural change in European economies that have reached their peak of quantitative growth and turned to a new phase of technological change.
- (d) Expansion was the answer to the appearance of new social groups in the educational systems and institutions. Girls, physical workers, minority students entered the systems during the 1960s and fought for new higher education and political systems (1968, Paris).
- (e) Educational expansion is independent of social, political and educational systems. The growing demand for schooling is a cultural pattern forwarded by generations to generations. If the parents performed elementary education, they demand the same level of education or more for their children. By this way, the demands grow according to the growing number of graduates.
- (f) Educational expansion is the characteristic of the middle class societies. In their value systems, education has a special priority. The growth of the middle class society is therefore accompanied by the growing demand for schooling. The stagnation or retrenchment of the middle class societies in the 1980s is an explanation for the end of educational expansions.

2.3 Expansion in Eastern Europe. Demands for (higher) education were growing also in the Eastern part of Europe. However, they show different periods of growth and meet, therefore, different political decisions. *Figures 3 and 4* present comparative data of higher education expansion between 1950-1990. Two groups of countries are represented: The Netherlands, Denmark, Italy and the UK from the EC, and Poland, Czechoslovakia, Hungary as well as Romania from the Soviet block.

 Figure 3: The expansion of higher education, Europe-West 1950-90

 Figure 4: The expansion of higher education, Europe-East 1950-90

- (a) At the end of the 1980s, EC countries are far ahead of the former Soviet block countries in terms of their student ratios. There are 2-3 % of students among inhabitants in the EC countries while the same ratios are only 0.7-1.2 in the Eastern part of Europe. The EC countries are closer to each other than to any of the former block countries and vice versa.
- (b) In spite of those attractive differences there are basic similarities in the nature of higher education expansion. It is especially clear at the initial period where every European countries had fairly the same ratios of students (the early 1950s).
- (c) The differences among higher education expansions started between 1955-1965. In that decade a time of rapid growth started everywhere (represented by points of inflexion in every country's S-curve). From that time on, EC country statistics show steady and rapid growth. While the Soviet block countries experienced a first and early "retrenchment" sometimes between 1965-70 (Czecho-Slovakia and Hungary), and a second one in 1975-85 (Poland and Czecho-Slovakia).

Instead of stepping into the period of rapid growth, *higher education in Eastern Europe remained in a period of stagnation*. The country figures show similarities with the EC-statistics, however they suggest that Eastern Europe is still before a period of rapid growth (Figure 2). In the coming decade, an educational expansion is expected in Eastern Europe.

2.4 Regional Differences and Alternative Policies. While showing essential similarities there are regional differences among the higher education systems of Eastern Europe. According to their differences, *Region A* can be separated from *Region B*.

a) *Region A* consists of units (administrative as well as political) where education has long been established and controlled by a central authority (government, "the state"). Elementary education was enforced by administrative ways. Secondary education existed during the last two-three centuries. In those centuries, middle classes have been established and their demands for (higher) education have cumulated. Today, higher education receive a growing number of applicants. The social and political elites have incorporated schooling into their value systems and higher education became a competitive commodity. Middle classes are strong enough to force higher education expansion even in the course of financial restriction and welfare state retrenchment.

Region A consists of the Nordic part of the Continent (Finland and the Baltic republics), parts of present Poland, Bohemia, Slovakia, Hungary, Slovenia, Croatia, Voivodina (Serbia), Transylvania (Romania), parts of Greece, the European part of Turkey, and goes down to Lebanon and Israel. Various governments ruled the territories and integrated them in European structures (empires like Sweden, Prussia, and Austria).

b) *Region B* is created by units that have been developed and organized a century later. Their middle classes could not gain political powers and they did not put (higher) education into their social and political priorities. Higher education remains a place of intellectual retrieval where the *intelligentsia* gathers and decides on their own problems. The *autonomy* of higher education is a political target and *state control* over its institutions is a political rather than an administrative question.

The Balkans were liberated under the Ottoman Empire towards the end of the 19th century. Parts of Poland as well as the Baltic republics were under Russian control again and again from the 17th century up until recently. Countries and states like present Moldavia or the Ukraine, Albania or present Bulgaria, Bosnia-Herzegovina have been formulated as the results of decisive wars during the latest years of the 19th century or just before WW I.

c) The growing demands for higher education can be met by alternative policies. *Policy A* means the slow-down of educational expansion. *Policy B* is the expansion within the higher education structures. *Policy C* initiates a new structure of tertiary education.

Scenario for Policy A. The government facing monetary reconstructions are not able to finance the "welfare state". Therefore it cuts off welfare expenditures including higher education. As long as the higher education system remains selective and elitist the central budget is generous to it. Higher education would survive in its traditional elitist form.

Scenario for Policy B. Its target is to stabilize the traditional (selective) structures while presenting them as a democratic system. Using democratization as a political argumentation it applies for more and more central support (subsidies). It incorporates post-compulsory education and research (basic and applied) into the existing university structures.

Scenario for Policy C. It is targeted to post-compulsory and tertiary rather than university education (Kivinen, Rinne 1990). It refers to the growing demand for further rather than higher education. Post-compulsory education is sensitive to market incentives. It can therefore be expanded even under economic constraints and budgetary reconstructions.

The growing demand for (higher) education seems to be a general phenomenon in Western as well as Eastern systems. The difference between the two systems is that the East European societies had been separated from the global development of demands and supplies in higher education. The Eastern societies were therefore still in their stagnating period as far as their demands for higher education are concerned. An *equilibrium* has been created between stagnating demands and the traditional structures of higher education. It is the explanation for a limited "welfare state" under the Soviet period.

Sudden changes took place with the political transition of 1989-90. With the abolishment of the political burdens of "irrational" and "unplanned" requirements, an explosion of demands for schooling started. The Eastern European governments must meet the growing social demands since they are elected and therefore responsible not to masters but voters. On the other hand, they also face an economic crisis and the need for budgetary reconstruction.

Today, higher education in Eastern Europe is at the crossroad. Governments still have the chances to choose among alternatives (Policies A, B and C). A shift from the traditional universities toward post-compulsory education would help democratizing the tertiary education while saving the traditional values of the universities. It is the challenge.

3 New Information Technologies: The Answer

The section reviews information technologies at the universities and describes their impact to the higher education of Eastern Europe. These technologies do not differ substantially from information technologies of the West, rather, they are imported to the region by Western sources. The basic difference therefore is the role of higher education management in the introduction of new information technologies. The East European higher education can only import technologies by the strong and direct support of their central governments.

It strengthens the ties of the universities to government bureaucracy while limits the amount of their autonomies. Also, new technologies may support old higher education structures (Policy A and B). However, they are applicable as the radical answer to the challenge of higher education expansion. In the latter case, the whole amount of "distance education" has to be reviewed and overcome substantially.

3.1 New Technologies. New information technologies arrived to the region after the transition of 1989-90. As the Eastern European countries were liberated under Soviet influence, the technological ban of the 1970s and 1980s has also been abolished. From that time, a technological revolution hit the entire economy and the everyday life. Parts of that revolutionary change are as follow:

a) *The lift of the ban on technological import.* Suddenly, the newest mashines arrive and the newest technologies became officially available. It is only a half decade back that East Europeans experienced those techniques and technologies that they might have studied (if any) in the literature. It was a real shock in Warszawa, Prague or Budapest to meet those instruments and to experience their capacities. It expanded the vision on and the expectation of the new technologies while it destructed the home made initiatives. The new situation, besides, contributed to the development of a legal market for information technologies and the abolishment of the gray and black market of mashines, instruments, knowledge and information.

b) *Freedom of ideas and liberation of information flow.* The 1989-90 transition put an end to the totalitarian regimes in the region. It meant the freedom of the media and the liberation of values and thoughts. Together with it, the East European media joined to international structures that needed the application of their technologies. The long and sophisticated party negotiations about the control of satellites and television transmissions were suddenly changed to the application for new transmission channels and the introduction of the latest communication technologies as consumer goods.

c) *Privatization and market incentives.* The 1989-90 transition is mostly interpreted (wether right or wrong) as the transition from planned to market economy. It is true that private incentives took place also in information and communication technology. Privatization of institutions producing and consuming information (like the media and the education) speeded up the introduction and dissemination of the latest technologies. Since those technologies can be bought on Western market, the liberalization of the technology import and the private incentives of knowledge industries went hand in hand.

d) *The globalization of the economy.* Multinational firms and international capital started to move into the region right from the beginning of the transition. To host foreign capital, transition states had to create international conditions in banking, marketing, investment and communication. The run and competition for foreign capital on the one hand and for the new markets on the other speeded up the dissemination of new technologies.

The revolution of information flow, knowledge industry and communication technology hit also the universities. Three phases of development can be separated in the 1990s.

a) *The introduction of the PC machines.* The PC became part of the university culture in some countries years before the transition (Hungary, Poland), while in other states with tougher political controls proved to be a sign of the new age coming together with the transition. The PC has a special story in Eastern Europe. First it appeared in academic circles and became element of the academic culture. During the mid-1990s the PC appeared in the service sector which left the academic sphere far behind. It became true during the generation change of the machines (1993-95). It can be followed also geographically. In stagnating territories and backwarded spaces in the region old style PC is still in use (also at universities like in Ukraine or Moldavia).

b) *Network development and the use of new communication technologies.* The second phase started around 1992-93, the slogan being the electronic connection among machines. It took the main form of electronic mail in the academic circles. While the first phase required the new hardware and software culture, this second phase presupposed the telecommunication connection. Telecommunication, the leading information innovation of the 1950s remained backwarded under the totalitarian regimes. They were separated from global influences and were politically interested in separating individuals and their communities from each other. So telecommunication backbones has to be constructed or reconstructed in most countries as well as networks have to be expanded. The story has been spiced with the ongoing privatization of the national telecommunication firms - East and West. It happens sometimes that Eastern national telecommunication is privatized by Western firms which themselves are still in the ownership of their own government like Deutsche Telecom or France Telecom.

c) *Worldwide information webs.* It is the development of the present years and is in its preliminary stage at most universities. Today, commercial services are far ahead of the academic circles in connecting to international networks. WWW is related with the revolution in the media and with the price explosion. In the early days media and communication were controlled politically rather than economically.

People in the region knew the political limits of their freedom to communicate while they never experienced the economic price of mass communication. Now they are getting to forget the one while getting to master the other. The exploding prices change the view of educational prices and the value of culture.

3.2 The Impacts. Modern information technology is available at the leading Eastern universities. It means however that institutions at the peripheries do not necessarily have even the essential conditions for making use of it. Institutions in regions A and B (see 2.4) differ from each other substantially. The appearance of new technologies make different impacts according to the higher education structure of the given state. In the following, we briefly analyse some of the educational and social impacts.

a) *Teachers' and students' roles.* The new technologies challenge the traditional philosophies of "distance instruction" (a phrase commonly used at Eastern universities instead of *distance education* or learning). The traditional philosophy stresses the role of the teacher and goes hand in hand with the traditional pedagogy in higher education (the professor as a leading actor, and the student as member of an audience). Actually, the traditional philosophy of distance instruction is more conservative today than the practice at most of the universities since the practice has been shifted from instruction to education while still having kept the active role of the teacher. The new technology needs a new philosophy in which the student acts as information consumer and the teacher as knowledge producer. It is a post-modern philosophy of education which is confronted even with the philosophies of active learning where the teacher acted as the manager of the learning process.

Philosophers even dare to say that the teacher might have the role of a *Maxwell demon* (third generation). The crucial role of *Demon III* is to give general education to *Demon II* which, in turn, teaches *Demon I* to select information (Buda 1997). Using this metaphor we may speculate on the possible role-set of the teacher on the process. The major impact of the new technologies is that the student rather than the teacher must start to speculate on his/her roles.

b) *From managers to producers.* The new technologies need new forms of institutional management. Institutional management in higher education traditionally concerns with the fact that academicians rather than managers held the respect while managers rather than academicians take the responsibilities (the hard tasks) to develop and run the academic organization. The new technology changes the roles of the academicians.

They are disappearing from the forefront (from "the stage") as selecting new information substitutes the consuming of the given information. Institutional managers are turning into the sales agents of the knowledge industry where former professors and researcher are producing new knowledge. Managers therefore are actively looking for new role models. Their role model was the educational planner in the 1960s and 1970s. It has been shifted from the bureaucrat to the business manager of the 1980s. The institutional manager of today has the role model of the producer. He/she is mutually interested with the professional (academician) in advertising and selling out the product, and building up new markets for it. The explosion of the press, the electronic media and the mass communication after the transition shifted most of the higher education institutions from schools to editorial offices and publishing agencies.

c) *Equality versus inequality of education.* Commonsense says that the use of modern information technology contributes to the equality in (higher) education. Against this commonsense the introduction of information technologies widens the gap among institutions in Eastern Europe. The reason is simple. These technologies presuppose infrastructural developments that need new investments. Since investment aids are limited and the competitions for them are hard, institutions with less powers are losing while the leading universities are gaining. Whether information technologies can be democratized - and if so by which ways - is still open to the future.

3.3 The Answer. *New information technologies can only meet educational expansion if the the system of (higher) education changes in Eastern Europe.* This statement is supported by the following arguments.

(a) The analysis of the earlier euphorias for educational technologies shows the following.

- At the turn of the 1950s and 1960s Eastern European education experienced the euphoria of the technology assisted teaching-learning (programmed teaching). This technological innovation made the following impacts: a hysteric campaign of the press for educational innovations, a new philosophy that was based on behavioral sciences and concentrated on the teaching-learning process in the classroom, new inventions and inventors (sometimes with phantastic machines), and later, disappointment and growing uninterest. Classroom practice remained undisturbed. The real results were new units for educational technologies in the teacher training and the growing interest toward a new philosophy that referred more to behavioral research than theoretical traditions.

- At the turn of the 1960s and during the 1970s, Eastern Europe experienced its second shock in educational technology, the electronic media (mostly in the form of television transmissions).

It has made the following impacts: a new vision about extramural teaching and learning (by TV-transmissions), a growing interest of teachers and communication professionals toward curriculum development and change, an euphoria for buying TV-sets and granting small schools with them (also with political argumentations). The effects lasted much shorter than the impact of Euphoria I. The reason has been partly the dynamic of technological development and partly that the educational system remained still untouched. If Euphoria III wants to last longer than its predecessors, the system must really be changed.

(b) This analysis also shows that *the successful educational reception of a technological innovation needs better education in the basics as well as better training in the practicalities*. Education of an academic type and practical training for the real life always create a keen equilibrium. Education is formation of a personality in morals and values where the personal history of the human being is more important than new information and flexibilities. It has to precede the proper use of the new technologies. The proper use of the new technologies needs a system which gives quality education for the pupils and students in order to prepare them for accepting and absorbing the growing amount of information forwarded by the new technologies.

(c) Educational expansion means the growing amount of part-time learners on various fields after their compulsory schoolings. In the time of necessary self-limitation of exploiting resources (including shrinking central budgets) extramural teaching and learning will become crucial. The question is, for what changes in the educational system.

The above argumentations lead to the proposition that *the use of new technologies be concentrated on the post-compulsory rather than the traditional university education*. Post-compulsory education is booming today in Eastern Europe. This new sector of education is still open to several innovations (private provisions, new management and administration, new relations between education and economy etc.). We have good hopes in Eastern Europe to expect that new technologies make impacts on tertiary education that will last longer than the earlier innovations.

4 Lessons To Learn

(a) *Higher education in Eastern Europe is at the crossroad*. A shift from the traditional universities toward post-compulsory education would help democratizing the tertiary education while saving the traditional values of the universities.

(b) The East European higher education can only import technologies by *the strong and direct support of their central governments*. It strengthens the ties of the universities to government bureaucracy while limits the amount of their autonomies.

(c) New information technologies can only meet educational expansion *if the system of (higher) education changes in Eastern Europe*. The use of new technologies be concentrated on the post-compulsory rather than the traditional university education

(d) A successful educational reception of the technological innovation needs *better education in the basics as well as better training in the practicalities*.

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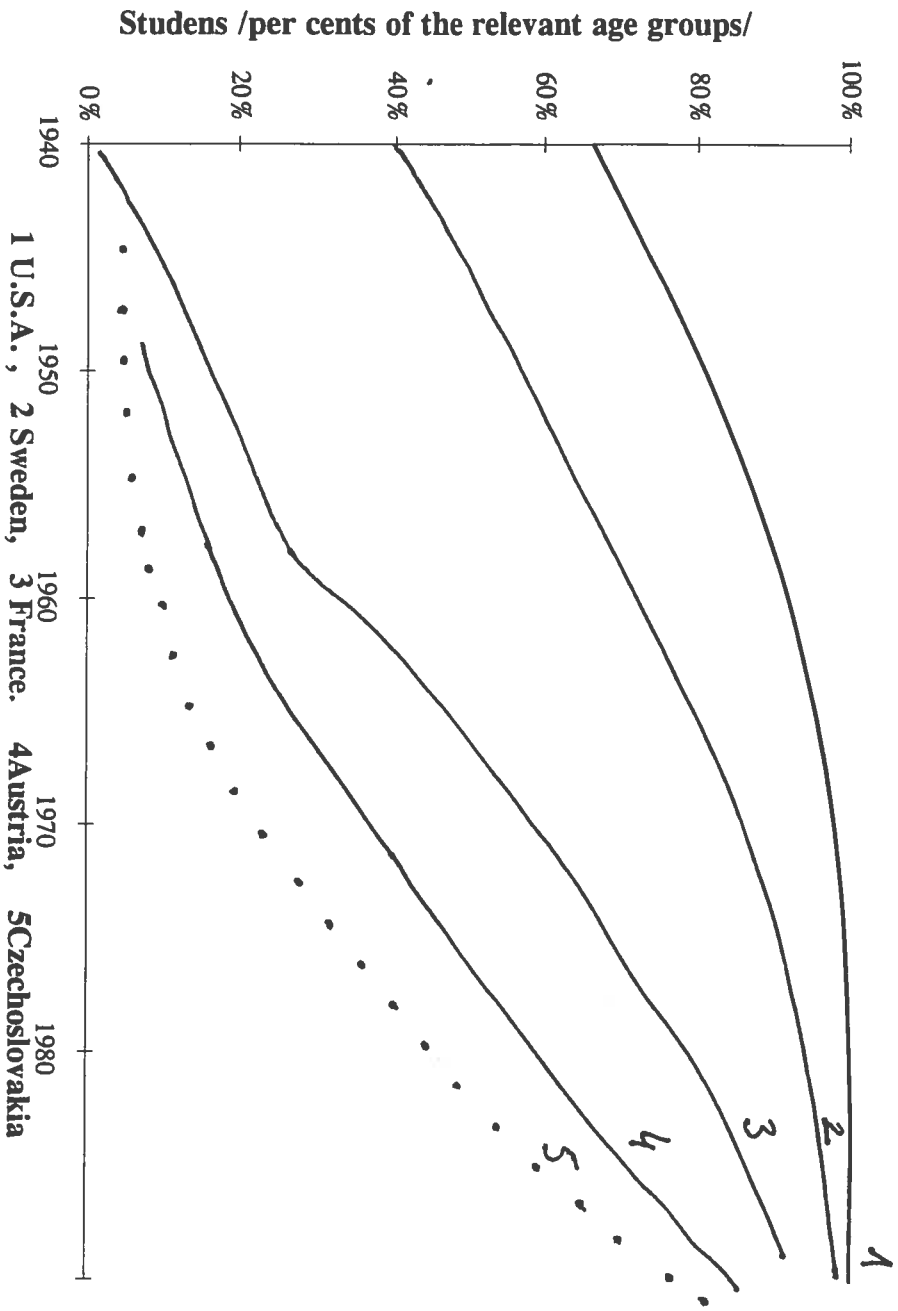


Figure 1. The Expansion of secondary education 1940-1980

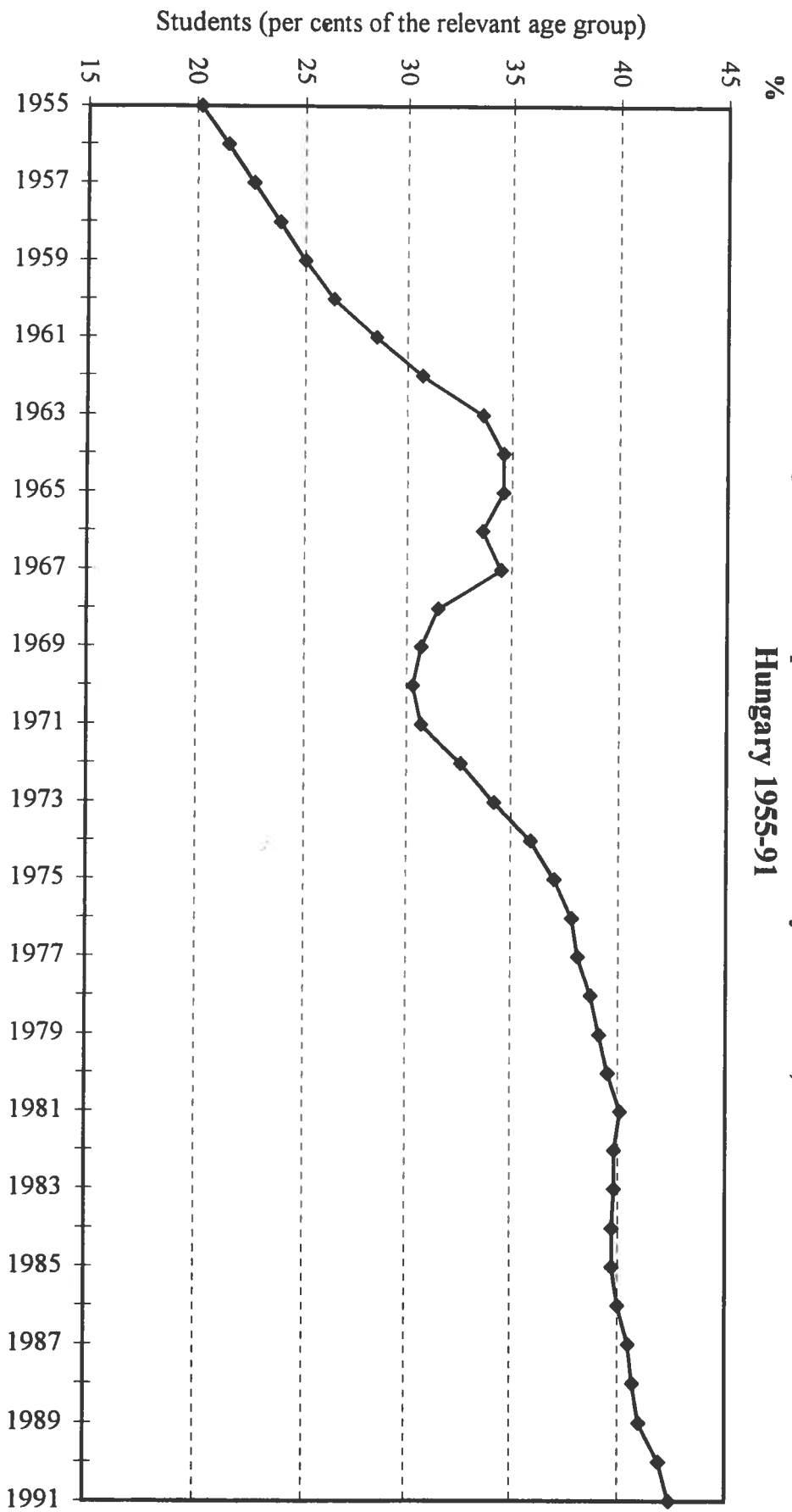


Figure 2. The expansion of secondary education,
Hungary 1955-91

Figure 3. The expansion of higher education
Europe-West 1950-90

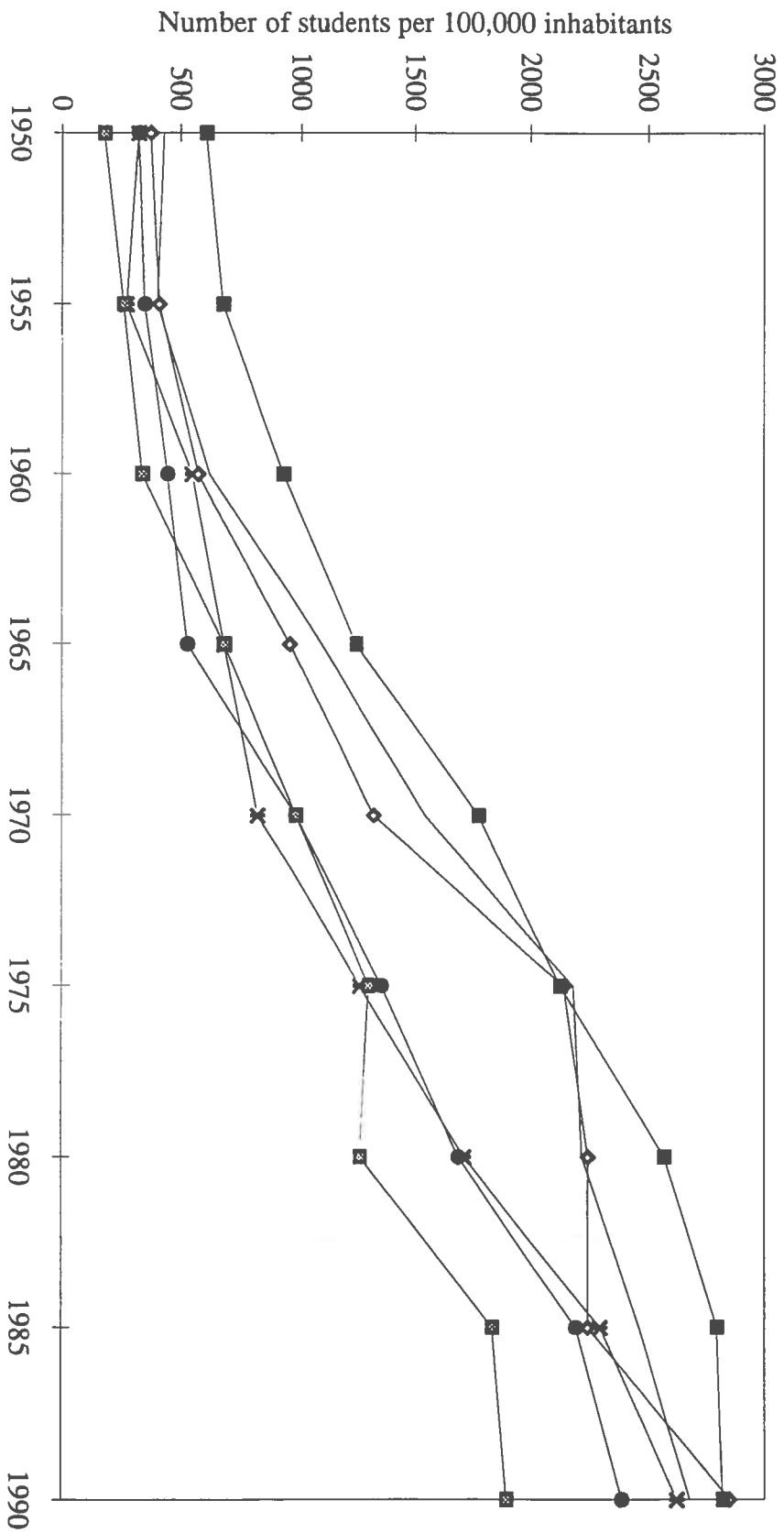


Figure 4. The expansion of higher education, Europe-East 1950-90

