Distance education and industrial production: a comparative interpretation in outline (1967)

by Otto Peters

Peters' first theoretical analysis of distance education was published as a 45-page monograph in 1967 entitled *Das Fernstudium an Universitaten und Hochschulen: didaktische Struktur und vergleichende lnterpretation: ein Beitrag zur Theorie der Fernlehre* (Distance education at universities and higher education institutions: didactical structure and comparative analysis - a contribution to the theory of distance teaching). The second half of this monograph is translated here and is also to be found in D. Sewart, D. Keegan and B. Holmberg (eds) (1983) Distance Education: International Perspectives, London and New York: Croom Helm Routledge, pp. 95-113.

INTRODUCTION

The more one attempts to grasp and explain the phenomenon of distance teaching, and especially the more one tries to identify the particular educational opportunities distinguishing this form of teaching from other forms of imparting academic knowledge, the clearer it becomes that the conventional range of educational terminology is not sufficiently comprehensive. Distance study represents facts new to education in several aspects. Compared with other forms of study it was novel in the form in which it made its first breakthrough over ninety years ago. With even greater justification it can be called novel in its present form in which it is currently spreading throughout the world, contributing towards the discovery of the educational opportunities provided by the modern media, such as radio and television. It is, above all, novel and pointing towards the future when it makes use of electronic data-processing equipment and wide-band cable transmission techniques. It is no coincidence that university study at a distance, in its early form of correspondence teaching, began its development only about 130 years ago, as it requires conditions that only existed from then on.

One necessity, for example, is a relatively fast and regular postal and transport service. The first railway lines and the first correspondence schools were established around the same time. When one further realizes how much technical support distance teaching establishments need nowadays in order to cater effectively for large groups of students, it becomes clear that distance study is a form of study complementary to our industrial and technological age. Lectures, seminars and practice sessions, on the other hand, have developed from forms of teaching derived from ancient rhetoric and were practised at medieval universities; the colloquium originates from the dialogic teaching methods of the humanistic era (Hausmann 1959:153). These forms of teaching have changed little in their basic structure since the beginning of the nineteenth century. They proved almost completely resistant to combination with technical support facilities. In this context they can therefore be described as preindustrial forms of study.

On account of these differences, distance study can only be described and analysed to a limited extent using traditional educational terms. They are not wholly adequate for this new form of study. This is understandable in so far as these terms developed from pre-industrial forms of teaching. If one applies them to distance study one will think in

conventional concepts. To emphasize the point, one looks at a new form of study from an old perspective and has one's view of the essential structural characteristics distorted.

Industrialization is the symbol of a new epoch in the development of man fundamentally different from all previous epochs. It is without example in history, above all, on account of the basic changes in most spheres of human existence. Academic teaching alone seems to have remained largely unscathed by industrialization - with the exception of distance study, for this form of study is remarkably consistent with the principles and tendencies of industrialization. For this reason, experimentally, structural elements, concepts and principles derived from the theories of industrial production are used here to interpret the distance study phenomenon. This does not mean that the teaching and learning processes occurring in distance study are equated with processes in industrial production. The comparison is purely heuristic.

A comparison of this kind between a form of teaching and processes from another sphere of life is legitimate and not without example in the history of educational theory. Amos Comenius, the 'founder and virtuoso of the method of parallel comparison' (Hausmann 1959: 68) in his Didactica Magna, for example, compared the 'art of teaching' in unusual detail with the art of printing, also a technical process. Theodor Litt identified the nature of pedagogic thinking by comparing it with artistic creativity, technology and the processes of growth (Litt 1958: 83). In the sixties, experiments were carried out which tried to explain the teaching and learning processes using the technical model of the feedback control system, in order to find approaches to a 'cybernetic pedagogy' (Frank 1965). Most impressive, however, was the achievement of Gottfried Hausmann who, in 1959, condensed the analogy between the dramatic arts and education into a 'dramaturgy of teaching'. In it he interprets the educational structure of teaching and learning processes in detail using the terms and principles of the dramatic art in the theatre. Paul Heimann saw the merit of this comprehensive and detailed comparison in the possibility that 'it might give rise to a complete revision of our teaching and learning models' (Heimann 1962: 421).

Furthermore, it may not be without significance for this planned interpretation that for another important aspect of university or college work, namely research, comparisons with the production process already exist. In 1919, Max Weber defined structural similarities between research institutes and capitalistic organizations (Weber 1951: 566) and, in 1924, Helmut Plessner pointed out that the 'mechanization, methodization and depersonalization of the manufacturing process equally dominate the production of economic as well as cultural goods' (Plessner 1924: 407). The following comparison between distance study and the industrial production process will prove similar consistencies.

From the start, distance study has a special relationship with the industrial production process in so far as the production of study materials in itself is an industrial process built into the whole teaching process as a constituent part, quite unlike the production of textbooks, for example. In the case of commercial distance teaching establishments the further question of selling the printed or otherwise duplicated study units adds calculations of applied economics to the teaching process. Even the distance teaching departments of government-financed universities are not entirely free from these considerations. It would be interesting to examine how far these facts have already influenced the structure of distance teaching.

In order to facilitate the discovery of further relationships between distance teaching and the production process, the following structural changes - essentially brought about by industrialization in the development of the production of goods should be noted:

1. According to the principle of rationalization, individual work as was traditional in the craftsmen's trades changes at an early stage to a production based on the division of labour (e.g., in factories), and this later leads to the development of assembly lines and mass production.
2. Work processes initially characterized by the use of tools are increasingly restructured by mechanization and, later, automation.
3. In detail, these changes lead to the following results:
    - The preparatory phase becomes increasingly important.
    - Success depends, among other things, on systematic planning and organization. Scientific measures of control are needed.
    - Work processes must be formalized and products standardized.
    - The production process is objectified.
    - Each developmental step towards increased mechanization leads to changes in the function of those involved in the production process.
    - Small concerns are no longer able to raise the investment needed for developmental work and technical equipment. A strong tendency towards concentration and centralization becomes noticeable.

The terms used in business studies to describe these facts will be outlined briefly and - where possible - applied to distance teaching.

RATIONALIZATION

By rationalization we mean all 'methodical' (that is, rationally guided) 'measures' with the purpose of achieving 'output with a comparatively (compared to earlier situations) lower input of power, time and money'. Scientific discoveries should 'be evaluated for practical use in such a way as to achieve the best possible results in view of the continually necessary development and redevelopment of economic and technical processes' (Seischab and Schwantag 1960: col. 4530).

Applied to the practical example of the production process this means that 'the entire production line, from raw material to end product, is carefully analysed to allow each single work process to be planned so as to make the most effective contribution possible towards achieving clearly formulated business tasks (Buckingham 1963: 24).

Georges Friedmann emphasizes that this is a dynamic process aiming at continuous improvement in quality through 'continuous progress in the study of materials, accuracy and precision' (Friedmann 1952: 203). Rationalization of this type has only started to develop with increasing industrialization at the end of the nineteenth century (Seischab and Schwantag 1960: col. 4531).

Management science holds that the reason for the considerable obstacles to rationalization lies in human nature itself, because 'human inadequacy inhibits the motivation to gain unprejudiced views and the willingness to act according to rational convictions' (Seischab and Schwantag 1960: col. 4530). Further obstacles are considered to be tradition, convention, habits and fashion.

In education, a rationalizing way of thinking is nothing new. In a general form, it influences the reasoning for numerous educational decisions. For example, the introduction of lectures to larger groups of students, the use of printed books and the specialization of university lecturers were considerable steps towards the rationalization of the academic teaching process. Every university teacher will, when planning a lecture, choose those subjects that will best help him or her to fulfil the purpose of that particular lecture. In distance teaching, however, ways of thinking, attitudes and procedures can be found which only established themselves in the wake of an increased rationalization in the industrialization of production processes. The characteristic details are, among others, as follows:

1. In distance study the teaching process is based on the division of labour and detached from the person of the university lecturer. It is therefore independent from a subjectively determined teaching situation, thus eliminating part of the earlier mentioned obstacles to rationalization. The division of labour and the objectification of the teaching process allow each work process to be planned in such a way that clearly formulated teaching objectives are achieved in the most effective manner. Specialists may be responsible for a limited area in each phase.
2. The use of technical equipment (duplicating machines, organization systems, transporting devices) makes it possible to convey the knowledge, ability and teaching skills of a university lecturer, by means of the detached objectivity of a distance study course of constant quality, to a theoretically unlimited number of students. The rationalization effect of mass production becomes apparent here.
3. The rigorous application of organizational principles and means saves teachers as well as students unnecessary effort.
4. At some of the newer distance teaching establishments, modern means of technical support, such as film, television and electronic data-processing installations, have replaced teaching staff in certain areas of their work, in particular, in the fields of giving information and assessing performance.
5. Students work through a course which has been tested prior to going to print. This prevents misunderstandings and stops students from going in the wrong direction.
6. The quality of a distance study course can be improved, because its effectiveness can be monitored at any time by scientific methods.

If the number of students required in a society outgrows the number of university teachers available, rational thinking should be able to find ways and means of changing teaching methods in such a way that the teaching resources of the university teachers available are used to the best effect, quantitatively as well as qualitatively. Distance study can be regarded as a result of such endeavours.

THE DIVISION OF LABOUR

The division of labour has played an important role in the sociological theories of the last 100 years (Durkheim: 1986; Schmoller: 1985). Applied to the production process it means that the work is split in the sense of 'dividing one complete work process into a number of elementary procedures' (Konig 1958: 27), as described by Adam Smith at an early stage (Smith 1776). With an extensive division of labour 'training periods become

shorter, more people are able to carry out the work and wages can be lowered (Konig 1958: 27).

A result of the advanced division of labour is increased specialization. The following statement, by Adam Smith in 1776, applies to everyone involved in a production process where a division of labour exists:

"Men are much more likely to discover easier and readier methods of attaining any object, when the whole attention of their minds is directed towards that single object than when it is dissipated among a great variety of things. It is naturally to be expected therefore that some one or other of those who are employed in each particular branch of labour should soon find out easier and readier methods of performing their own particular work, whenever the nature of it admits of such improvement (Smith 1963: 110)."

Just as the division of labour is a precondition for the mechanization of work processes and for industrialization as a whole, it has made university study at a distance possible. The division of labour is the main prerequisite for the advantages of this new form of teaching to become effective. The principle of the division of labour is thus a constituent element of distance teaching.

The 'complete work process', which is split in distance teaching consists of the teaching activity of the university lecturer: namely the entirety of the measures he takes in order to initiate and guide learning processes in students. Initially, the two basic functions of the university teacher, that of conveying information and that of counselling, were allocated as separate responsibilities in distance teaching departments of universities or colleges Both functions above all however that of transmitting information, are now even further divided. If, for example, the number of students enrolled on a distance study course is high, regular assessment of performance is not carried out by those academics who developed the course. The recording of results is the responsibility of yet another unit; and the development of the course itself is divided into numerous phases, in each of which experts in particular fields are active.

This specialization may bring the following advantages:

- Materials required for the development of the distance study course can be assembled by leading experts in the specialist fields concerned.
- Having completed the manuscript, the author can then be freed from the time-consuming processes of exact source references and of lecturing.
- Educationists and experienced practitioners of distance teaching are able to revise the manuscripts of study units in order to make the planned teaching process more effective.
- Colleagues from the 'academic middle tier' may be involved in the correction of exercises carried out by students. There are cases where even senior students have taken over such tasks, especially where they are concentrating on marking the exercises from a limited number of correspondence units. As in the industrial manufacturing process, the level of previous training may be lower on account of the division of labour and, as there, 'more people are able to carry out the work'. Since with extensive specialization of this type the number of scripts one

university teacher is able to mark may be much higher, this process is also cheaper.

MECHANIZATION

Mechanization means the use of machines in a work process (Buckingham 1963: 17). These machines replace the work done by the muscles of men or animals. In part they even take over elements of brain work. There are varying degrees of mechanization. The pre-industrial stage is characterized mainly by craftwork making use of tools. The first level of industrialization was reached with the use of 'dependent machines'. The second level of industrialization led to mass production as a result of the use of 'semi-independent machines' and assembly lines. Finally, the third level of industrialization is characterized by the spread of automation (with automatic control or feedback). The changes occurring at each level are so great that, in this context, one author has spoken about a first, second and third technical or industrial revolution (Buckingham 1963: 17).

In order to stay with this analogy, distance study could be ascribed to the industrial levels, as it cannot take place without the use of machines. Duplicating machines and transport systems are prerequisites and later forms of distance teaching have the additional facilities of modern means of communication and electronic data-processing installations

In contrast, when considering the framework of conventional study, one cannot help thinking that its forms of teaching belong to the pre-industrial level. There the university teacher is comparable to a craftsman as he uses 'tools' (pictures, objects books), without these changing the structure of the teaching process to any considerable degree.

ASSEMBLY LINE

Buckingham referred to the importance of the assembly-line principle in connection with the use of machines. Both these factors, among others, had made mass production possible (Buckingham 1963: 20). Assembly-line work is characterized by the fact that the worker remains at his place of work whilst the workpieces travel past him.

The formal similarity between distance teaching and the production process becomes particularly noticeable here. In the development of the distance study course the manuscript is passed from one area of responsibility to another and specific changes are made at each stage. The study units are printed on a large scale, stored, sent to the distance learner, who completes them, sent to the script marker who checks the work, and finally submitted to the administration, where the performance of the distance learner and the effort of the script marker (to calculate fees) are recorded. The rationalization effect achieved by the fact that many university teachers and thousands of students do not have to meet in one place in order to participate in teaching events is at least the same as that which a car manufacturer tries to achieve when, instead of sending the worker to the vehicle to be built, he transports the necessary parts to the worker. In both cases - the production process as well as distance teaching - time, energy and money are saved.

MASS PRODUCTION

In modern sociology the term 'mass trend' has rid itself of its negative cultural connotation, making it a largely neutral expression (Konig 1958:171). Mass trend nowadays merely denotes a structural characteristic of an advanced industrial society and indicates 'that in a pure consumer society such as ours the rise in the standard of living is due purely to the fact that industry produces certain consumer goods and commodities in large quantities, thus making them generally accessible' (Konig 1958:171).

Mass production is by its nature only possible where there is a sufficiently large 'mass of consumers'. This, in turn, requires an efficient transport system providing a connection between producer and consumer who, as is typical in today's system, are geographically distant. In order to work profitably, producers need to research consumer requirements and find standards acceptable to all consumers for their products They must continually improve their goods (aim at perfection), as each shortcoming is multiplied by the number of items produced.

If one equally rids the term 'consumer' of its negative cultural connotation, one can speak of the student as a 'consumer of academic education'. Quite obviously, 'demand' outstrips 'supply' at universities and colleges, and this had led to the large-scale operation at our universities and colleges As traditional forms of academic teaching originally envisaged small groups of students and today's practice of applying methods designed for small groups to large groups must be seen as a perversion of an educational concept (for example, lecture rooms with loudspeaker connection), one can understand it if various governments see distance teaching, on account of its similarity with the mass-production process as a means of providing very large groups of students more adequately with academic teaching than conventional methods would allow.

Indeed, the multiplication effect achieved by technology and the postal delivery system means that the university teacher and the distance learner - like producer and consumer - no longer need to live in the same geographical location.

From an economic point of view, the production of distance study courses represents mass production. Apart from reasons of profitability, the large number of courses produced forces distance teaching organizations to analyse the requirements of potential distance learners far more carefully than in conventional teaching and to improve the quality of the courses. For example, in the USSR the Public Accounts Authority complained at one time that too many students dropped out of distance study, and it is suspected that this might have been the reason that led to an examination of the study materials. Most American distance study courses are revised and re-issued at regular intervals (every one to four years). As American universities charge fees to cover the greatest part of the budget allocated to distance teaching departments the quality of distance study courses must not be allowed to deteriorate. When, on account of mass production, the University of California has more distance study courses to offer than there is demand for them, it occasionally places advertisements for students in newspapers

Statistics prove that the number of graduates in areas without a university is lower than in areas near universities. It is possible that, according to the principle of mass production, distance teaching will one day equalize the opportunities to study, just as industrial mass production has assirnilated consumer patterns in town and country.

Analogous to the increase in the standard of living, this would make a general increase in the level of education possible, which might not otherwise have been achieved.