23 ICT: New Opportunities for Higher Education Institutions to Train Employees?

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Abstract

Higher education institutions are confronted with a declining growth in the number of students in initial education. At the same time, the market for training of employees has increased significantly. Between 1993 and 1999, the total training volume on this market has doubled. However, at least in the Netherlands, higher education institutes altogether have only a small and stable share in the training of employees of about 2%.

The central question of this paper is to what extent the growing possibilities of using ICT as a training tool can help higher education institutes to enhance their position in the market of training of employees. The empirical evidence presented does not support the expectation that ICTis already the vehicle leading to drastic changes. A large scale survey among companies at the end of the nineties in the Netherlands showed that the use of ICT as a training tool was at that time limited to only 12% of all training incidences. Moreover, the companies did not expect a strong growth. This has to do with a large variety of bottlenecks companies perceive. Succesful implementation means dealing with considerations from many angles: pedagogical, technical, organisational and last but least cost-efficiency.

Even if the use of ICT as a training tool would rise considerable, this would not automatically mean an improvement of the position of higher education institutes. The survey results do not give indications that higher education institutions have a relative large share in ICT-based training.

Keywords: ICT, continuing training, training market

1. Introduction

Life long leaming has become an important focus point in social-economic and educational policy. Owing to a number of developments, some supply-driven, others demand-driven, competences tend to become obsolete faster and faster. On the demand side, technology and consumer preferences change more rapidly then they used to do. The process of globalisation of the economy continues. Partly in response to these developments, companies adapt their organisational structure. As a result, the job structure and the contents of jobs tend to change continuously. Workers, then, have to keep on investing in human capital during their working career to remain employable.

On the supply side workers feel a growing need to adjust working hours and job contents to their - increasingly diverse – preferences, owing to the process of individualisation (see for example Schmid, 1998). The traditional pattern with men working full-time and women concentrating on non-market activities is disappearing. Both women and men wish to participate in the labour market and must then share non-market activities. Consequently, changing family situations will lead to changes in the number of hours worked. Care taking activities may take so much time that people even wish to withdraw temporarily from the labour market. The same is true when workers, wishing or forced to change profession, have to spend considerable time on training. Workers may not always be able to realise these transitions without changing jobs. Job-to-job mobility will often be accompanied by training.

The ageing of the population is the second major factor, affecting labour supply. Older workers are more likely to face outdated skills than younger workers. Until now most workers withdraw from the labour market long before reaching the official retirement age. Given the labour shortages the Dutch economy is experiencing, there is need to increase participation rates among people older than 50 years of age. This would require considerable efforts in the field of training.

This all add up to a situation in which participation rates in continuous training will have to be increased considerably. As will be illustrated more deeply in section 2, existing figures do show such a strong growing participation in the training of employees. This growing market of continuing training and education offers a number of opportunities for higher education institutions and regular schools in general. However, traditionally, the activities of higher education institutions are very much focussed on initial education.

The central question of this paper is to what extent the growing possibilities of using ICT as a training tool can help universities to enhance their position in the market of training employees. The use of ICT in training of employees has a

number of potential advantages. For example, ICT means flexibility in time and place of use, which means that training is easier to combine with working obligations. Higher education institutions do not have bad starting position in this area. Being large institutions, they often have already a quite well developed ICT-infrastructure and have experience using ICT for initial education. On the other hand, private providers are also increasingly trying out to find the relative advantages of ICT as a training tool. Moreover, ICT also gives opportunities for universities from outside Europe to compete with their sister institutes in Europe.

Concerning the importance of the role of ICT in training of employees, little research has taken place. This even more the case for the specific position of higher education institutions in this area. In the recent years, the Research Institute of Labour Market Policy has carried out a few studies in this area (Gelderblom, de Koning and Blanken, 2000 and Gelderblom and de Koning, 2000). This includes:

- A review of existing literature;
- A great number of face to face interviews with representatives of companies and training organisations, using ICT as a training tool for employees.
- A large scale survey among companies;
- A study on the costs and benefits of using ICT as a training tool in the area of training of employees.

In this paper we will highlight the findings out of these studies which are of particular relevance to the issue of potentials for higher education institutions to further develop their share in this market.

The structure of the paper is as follows. In section 2 we will describe the growing importance of continuing training for employees in general and the present role of higher education institutions in this market. In section 3 we elaborate on the importance of ICT as a training tool and the expected influence this has on the position of higher education institutions in this market. In order to know better what limits the use of ICT as a training tool, we describe a number of bottlenecks (section 4). In section 5 we stress the importance of a better insight in (factors contributing to) the costs and benefits linked to ICT as a training tool, before more definitive conclusions on future prospects can be made. Finally, in section 6 we end with a number of concluding remarks.

2. The growing importance of continuing training and the role of higher education institutions

Participation in higher initial education has increased for a number of decades. However, in recent years this increase has slowed down. For university education, there has even been a decrease in participation (table 1). For the coming years a small growth is expected.

	95/96	97/98	99/00	04/05 (prognosis)
Higher vocational education (full-time)	218	226	239	256
Higher vocational education (part-time)	41	42	52	71
University education	175	164	158	164

Table 1. Participation in higher education in the Netherlands (in thousands). Source: OC en W in kerncijfers 2001, Ministry of Education, Culture and Science.

In contrast to this, the (potential) market in the area of continuing training of employees is clearly growing (table 2). The total costs of companies for training of employees is estimated to more than 3 million Euro in 1999 in contrast to less than 1 million Euro in 1986.

Year	Training incidence per 100 employees	Total costs of companies (in million of Euro)
1986	25	946
1990	33	1311
1993	38	1531
1999	77	3052

Table 2. Developments in volume of training of employees. (These figures include all types of training which are at least partly financed by the company. Companies with less than 10 employees are not included in these figures.) Source: Central Bureau of Statistics, Netherlands

Higher education institutions have a very small share in this market (table 3). In 1999 both for higher vocational schools as well as universities, somewhat more than 30 thousand training incidences took place in 1999. This is a small proportion compared to the whole market (both somewhat more than 1%) and compared to the volume of participants in initial education (table 1). The share of higher education institutions has also been quite stable. Also in 1993, their common share was 2% of the whole market. The market for continuing training is largely

dominated by companies supplying their own training (45%) and by private training institutes (31%).

	Training incidences (in thousands)	%
Universities	31	1
Higher vocational schools	39	1
(Other) public education and training institutes	290	10
Private training institutes	900	31
Suppliers of machines and software	130	4
Mother or sister companies	82	3
Unions	1	0
Chambers of Commerce, branche institutes, employers organisations	98	3
Company itself	1306	45
Others	18	1
Total	2896	100

Table 3. Training incidences by supplier of training, 1999
Source: Central Bureau of Statistics, Netherlands

3. ICT: changes in the market of continuing training?

So, until recently the role of higher education institutions in the area of training of employees is limited. The increasing use of ICT could mean a change in this respect. The potential changes because of ICT depend on the extent to which:

1. ICT (is)/(will be) used as a training tool for training of employees. If the role of ICT is limited, than expected changes in the structure of the market because of this will be limited;
2. ICT as a training tool can be considered as additional training in the sense that ICT helps to organise training in situations where otherwise no training would have taken place. Points 1 and 2 together determine to what extent the market of training of employees grows as a whole because of the use of ICT as a training tool.
3. the use of ICT could improve the relative position of higher education institutions in this market.

The potential changes for higher education institutions because of ICT will be higher, the more important this training tool turns out to be, the more this will lead to additional training and the more this will change their market position compared to other suppliers. In the following of this section, we will go into these three aspects.

3.1. The importance of ICT as a training tool

In the Netherlands NIDAP organises a yearly survey on continuing training among approximately 800 companies with at least 50 employees. For the survey over 1999, we made use of the possibility to add a number of questions to this survey about their use of ICT-based training. The outcomes of the survey lead to the following estimates for the quantitative use of ICT-based training of the employed (table 4). Some of these figures are constructed by combining the survey outcomes with other data sources of training participation in general. The figures refer to the year 1999.

Proportion of larger companies (>50) using ICT as a training tool	32%
Proportion of larger companies (>50) using a CBT as a training tool	23%
Number of employees trained through ICT (including extrapolated figures for smaller companies)	300.000
Participants in training through ICT as a proportion of all trained employees	12%

Table 4. Estimates for some indicators for reach of ICT as a training tool in the Netherlands (1999)

About a third of all larger company (also) makes use of this way of training. In most cases this concerns training by using a CBT on a cd-rom. Those who use applications using the Internet have often used a CBT on cd-rom before. Using the Internet without former experience with CBT on cd-rom is less common. In terms of employees, training through ICT concerns about 300.000 employees, which is already a considerable volume, but is still quite a small proportion of all training. We have also asked about expectations for the future. The answers from company side reflect growth, especially in the area of applications using the Internet. However, the expected growth cannot be characterised as spectacular. For all applications concerned the expected growth is about 2 or 3 percentpoints of "extra" companies using these applications in the next year.

So, the share of training in which ICT is used as a training tool should not be overrated. However, the figures mentioned

above related to the total market. It is possible that ICT is much more important in the segment of the market in which higher education institutions operate. We know that the use of ICT in general is more widespread among these groups. The low-educated and the older workers have more problems in using ICT (Gelderblom, de Koning and Mosheuvel, 2002). In the survey, companies admit that the advantages of ICT in terms of easier access to training are more felt for the young and higher educated employees. An example of concentration of the use of ICT as a training tool in a segment in which higher educated employees are concentrated is the ICT-sector itself. This seems logical, because in this case the training tool as well as the training content are very related. From all larger companies who are involved in training for their employees, about a third makes use of a CBT. For companies in the ICT sector, this is two-thirds. For other (internet-related) applications, the differences compared to other sectors are often even higher.

However, we have also found several examples of the use of ICT in other segments. For example ICT is also often used for courses which are linked to getting acquainted with certain standard or compulsory procedures. These procedures could be for example safety-procedures as well as quality procedures. Examples of ICT-based courses are safety-procedures in a heavy metal company, in using electric machinery, and safety procedures linked to working on a train. In all of these examples most of the trainees concerned were not higher educated. We even came across ICT-application in training of employees working in state-subsidised social working places in which workers with very low qualifications are employed. ICT was considered to be advantageous to these types of workers because it offered possibilities to use multimedia and to be less text-oriented.

All in all we can argue that ICT is somewhat more important in the specific segment in which higher education institutions operate, but the differences should not be overrated. This means that the conclusion of a limited role of ICT also stands for the segment of training of the higher educated.

3.2. ICT: additional training

Concerning the second point, one of the crucial finding of the survey among companies using ICT as a training tool, is that more than half of them acknowledged that ICT as a training tool had increased the volume of training in their company. A confirmation of these subjective perceptions is that the volume of training in companies making use of ICT is larger than in other companies in which employees are trained, but without ICT. However, the latter is on itself not a 100% convincing argument, because it is also possible that companies with already high training volumes could have a higher incentive to make use of ICT, because of economies of scale.

Much higher	18%
Higher	39%
No effect	39%
Smaller	4%
Much smaller	1%

Table 5. Effect of ICT as a training tool on training volume
Source: NIDAP-survey among companies.

From the interviews among companies and training institutions making use of ICT, we know that the increased flexibility of time and place is a crucial background factor for implementing this. In the field of training of the employed, the workers to be trained have often problems to combine obligations from work, household and training. Conventional forms of training usually require that groups of trainees attend a course on the same place and time. This must be organised well in advance. The training will thus often coincide with periods of high work pressure. Some types of work, training of pilots, for instance, are by nature difficult to combine with conventional forms of training, because the workers involved are 'in the air' and "over the world" with complex and various time schedules. If there is more freedom in the choice of time and place to be trained, these types of bottlenecks can be relieved.

The flexibility of place also means that regional borders for potential trainees are less relevant. This means that the potential target group for training suppliers could be enlarged. However, this of course also increases the potential number of competitors. In general the competition will be stronger. Even competition from institutions from other countries can appear. An example is the University of Phoenix.

Another underlying factor for the potential of ICT to increase training volume, is that ICT makes training possible in some area for which effective training was difficult to realise. The most obvious examples are simulations. An example is the Rotterdam School of Management which has made a simulation for those responsible for selling and buying electricity in a liberalised energy market. The high reality value of such a sort of "game" cannot be approached by more conventional ways of training. Another example are sailors practising on a sea-ship bridge simulator.

3.2. Market share

The influence of ICT on the relative position of higher education institutions is more difficult to predict. In first instance one could argue that the starting position of higher education institutions is relatively strong. They often have already experience with using ICT in initial education. Moreover, they can profit from the fact that economies of scale are very important is this area. The use of ICT is generally linked to high fixed costs and relatively low variable

costs. So one has a more advantages position if the potential number of trainees is high. Potentially, this is the case for higher education institutions. However, in reality this advantage of economies of scale should not be overestimated. First, it will not always be easy to combine ICT-applications in the areas of initial education and post-initial education. The pedagogical demands can vary between the two fields. In the area of post-initial education, the link with work practice of the trainees can be very important. In initial education, the development of conceptual thinking and abstraction is crucial. Many institutions have chosen for a clear separation of the post initial training within the institution, because this requires a specific approach. Secondly, higher education institutions generally try to use "quality" as a strong marketing point in comparison to for example private training institutions. However, there can be a friction of quality and economies of scale. Quality can for example mean that in a computer-based context, the interaction with other trainees and the teacher still has an important emphasis. This could mean that the training still takes place in the context of relative small groups in order to facilitate sufficient interaction. Quality could also mean that the possibilities for "re-using" content are more limited, because training demands change and updates regularly have to be made. Moreover, the content of the training could be quite customised, so the potential target group is in that case small. Thirdly, exploiting economies of scale requires a coordinating administrative hand. However, in practice many decisions in this field are made at a decentralised level without clear coordination in order to exploit economies of scale. An obvious example of a crucial decision to be taken at central level is a uniform choice of electronic learning environment software.

So in some respects (experience and scale of operation), one could argue that higher education institutions have a favourable starting position in using ICT as a training tool. The earlier-mentioned NIDAP-survey offers some possibilities to test the actual position of higher education institutions. In the NIDAP-survey there is information about the importance of various types of suppliers in the area of training of management at medium and higher level. In this area we can also make specific selections of companies making use of ICT as a training tool. We can compare the composition of suppliers of these companies using ICT-tool with the general picture of training suppliers (table 6).

The proportion of higher education institutions in the supply of training for management and executives is on average about 17%. If we only select companies for which ICT is used as a training tool in external training, this proportion is roughly comparable to this. These figures do not confirm that the market position of higher education institutions is stronger when ICT is being used as a training tool.

The conclusion of this section is that the position of higher education institutions in the continuing training market has not drastically changed because of the emergence of ICT as a training tool. ICT is only used in a small proportion of all training incidences. Moreover, there are no indications that higher education institutes have improved their relative position if ICT is used.

Type of companies	Average proportion of higher education institutions in the supply of external training of management and executives
All companies offering external courses for management and executives (n=686)	18%
All companies using CBT on cd-rom in external training (n=133)	17%
All companies using an online connection in external training of management (n=43)	17%
All companies using distance learning with the computer in external training of management (n=62)	24%

Table 6. Training suppliers of management training, with specific reference to the training tools
Source: NIDAP-survey

4. Bottlenecks

The former section shows that the importance of ICT as a training tool in continuing training is rather limited. To have a better understanding why this is the case, we have to know more of existing bottlenecks appearing when ICT is used as a training tool. Both in the interviews and the large-scale survey we have paid attention to these bottlenecks. The main conclusion from both sources is that problems do show up in varied areas:

- The training process itself (e.g. problems caused by the lack of social interaction). A continuous danger of these types of applications is that in the development phase most attention is given to "technical" aspects, while the pedagogical considerations are soon out of sight;
- The lacking ICT-knowledge and competences of both users and trainers;
- Technical problems. These technical problems are also diverse in nature. Table 7 illustrates this.

Problems in provisions	*Problems in support and maintenance*
– The problem of band-width with Internet, especially for using multi-media – Videoconferencing is still a "non-proven technology" – Available computers are not powerfull enough – Participants have outdated Internet-browsers – Employers are not familiar with certain applications (this was for example the case with using cd-I for training) – Training participants have to work in a software environment they are not familiar with	• Problems in installing • Installed training programmes are "by accident" mutilated by others who use the same computer • Confusion about who is responsible for support: the training department, or the general ICT-help-desk in the company • Technical support is easily available during working days, while trainees study in the weekend • The management of necessary accounts is underestimated: – Import and authorisation of new trainees – Assignment of e-mail addresses – Assesment of training progress – …….. • Problems of security • In times of a transition towards a new computer system, training programs are lost or not convertible • Updating of CBTs turns out to be difficult, while this is crucial in an environment with constant changes

Table 7. Examples of technical problems

Other studies conform this variety of potential problem areas (see for example Fastrack consulting, 1999 and Green and Stahmer, 1996). Consequently, introducing this type of ICT-applications requires constant attention and well-considered choices in various fields. We have come across many projects that have failed or nearly failed as a result of a number of problems in the starting phase.

5. Costs and benefits

The bottlenecks mentioned in the former section can influence costs and benefits of using ICT as a training tool in such a way that the overall balance is negative. Changing fom conventional to ICT-based training just because the latter "has the future", without any assessment of the costs and benefits involved, may lead to a waste of money. ICT-based training only has a future when it outperforms classroom training and other traditional forms of training in terms of its cost-benefit ratio. It is not self-evident that this is the case. In general the views on the economic impact of ICT have changed dramatically. The developments on the stock markets indicate that nowadays there is serious doubt about the profitability of ICT activities and products. This is in sharp contrast to the opinion that ICT would increase productivity for decades to come, which was common only a few years ago. ICT activities and products often require large investments of which the returns are highly uncertain. This is also the case for ICT-based training. The reason for publishers, IT-companies and training companies to start developing and using ICT-based training is partly due to the fact that they are afraid to miss future markets. If ICT-based training would ultimately prove to be more effective and efficient than conventional forms of training, and would gradually replace the latter forms, it is of vital importance for these companies to start investing in ICT-based training now, even if this is loss giving for the time being. From our interviews with a number of these companies it appears, in fact, that so far many forms of ICT-based training have been loss giving. According to the respondents in the NIDAP-survey, the use of ICT in training increases rather than decreases the operational costs of training.

However, we also noticed that there is a lot of uncertainty about the costs and benefits of ICT-based training compared to conventional training. Very little is known about the costs and benefits of ICT-based training compared to conventional training. This is both true for the cost-benefit ration on the macro level and for the different actors individually. Gelderblom and De Koning (2000) have developed a cost-

benefit model in which the different types of costs and benefits for both variants are included. Furthermore, they have performed numerical exercises in which values were attached to the various costs and benefits. Partly these values could be based of a concrete example of a company-training course, which had been given in both an ICT-based form as well as a conventional form. In other cases assumptions had to be made. Sensitivity analyses were made to deal with the uncertainly arising from this. The simulation results indicate that a shift towards ICT-based training is particularly profitable when:

- it leads to a considerable increase in the number of trainees;
- the number of foregone productive hours is limited;
- the dropout rate among trainees is reduced;
- the input of trainers can be reduced.

The simulations clearly demonstrate that ICT-based training is certainly not profitable under all circumstances.

If uncertainty about (the balance of) costs and benefits continues, actors may hesitate to further invest in this area. More research is necessary to have a more clear view on these matters and to have an overall picture of the cost-benefit issue.

6. Some concluding remarks

Life-long learning is of crucial importance in a continuously changing social economic environment. Skills and competences have to be updated regularly. Therefor, the market of training of employees is a strongly growing market. Until now, higher education institutions have a very limited position in this market. One could argue that this picture could be changing drastically because the whole market of training of employees will be structurally influenced by the rise of ICT as a training tool (e.g. "E-learning"). For example, ICT means flexibility in time and place of use, which means that training is easier to combine with working obligations. However, the use of ICT as a training tool is still limited to a small proportion of all training incidences. Most companies expect only a moderate growth in the use of ICT-based training for the next years. Succesful implementation means dealing with considerations from many angles: pedagogical, technical, organisational and last but not least cost-efficiency. Firms and training institutes will use ICT-based training in the longer term only when they can be sure that the costs are outweighed by higher benefits. In many cases the impact on cost-efficiency is simply unknown, although the general impression is that at least some cost factors are considerably increased by using ICT.

On the basis of our findings we conclude that so far ICT has not been the electronic highway to life-long learning. It is not more than 'a' way. This is line with the general scepticism concerning the profitability of ICT activities prevailing nowadays. However, on long-term things may be somewhat different. Probably, most of the practical problems will be solved in the next years. Further research may reduce the uncertainty concerning the costs and benefits of ICT-based training. However, we cannot exclude the possibility that this form of training will not prove profitable in many cases.

Even if the use of ICT as a training tool would rise considerable, this will not automatically mean an improvement of the position of higher education institutes. The empirical evidence presented before, does not give indications that higher education institutions have a relative large share in ICT-based training.

One of the factors contributing to succesful implementation can be cooperation between several actors. Cooperation can mean that costs are more spread, while the reach of trainees is increased. Two studies inventorising the situation in other countries (Boezerooy and others, 2000 and van der Wende and others, 1999) stress the importance of such cooperation. The type of cooperation can vary. For example, several institutions can distribute their courses under a common heading leading to better marketing opportunities and a strong actor with a varied supply of courses which helps to become an interesting partner for business. An examples of this type of cooperation in distributing is the eUniversity in the UK. Another possibility is for software companies and training institutions to join forces in order to raise sufficient funds for development and to reduce uncertainty that the investments will not lead to products which will not be used.

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- Gelderblom and de Koning (2000). This project was carried out in cooperation with CINOP and Bureau Telecoach.

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