Rethinking Knowledge In Construction: Improving Process By Using A Brain-Drain Approach

Wilco Tijhuis
University of Twente, The Netherlands
Email: w.tijhuis@utwente.n1 and tijhuis@wtbeheer.com

ABSTRACT

In learning organisations, information and skills gathered from completed projects are distributed (with or without fee). Unfortunately, in many projects, the same mistakes are still made.

This paper describes situations related to the construction industry and the 'level of knowledge and skills' in organizations. It emphasizes the need for updating knowledge and skills from a project's point of view, using it for improving processes and reducing the risk of a 'brain-dip' due to 'job-hopping' and retirement of employees. The 'Brain-Drain' approach is proposed and illustrated with results from a case study for improving the often 'static' knowledge inside the companies by refreshing them with 'dynamic' knowledge from outside. It also shows the serious need for recognizing and valuing employees' knowledge and skills. It is recommended that the 'Brain-Drain' approach can establish and ensure a continuous improvement of knowledge and experience, and that it keeps the social business networks updated in the construction industry.

Keywords: Brain-Dip, Brain-Drain Approach, Construction industry, People, Transfer.

INTRODUCTION

In the construction industry in general, several problems are distinguishable. In analyzing the field of technology for example, one can see the unfulfilled promises of the Internet and other (digital) communication, as it is still in its evolutionary processes (see EEIG, 1999; Tijhuis, 2001a). Also, one can recognise the 'mental barrier' in clients, which leads to their difficulty in accepting new concepts in real estate markets, while new ways of thinking e.g. (life-cycle) are sprouting in other branches of the industry (Eger et al., 1991). Additionally, one must not forget the obviously increasing cost-overruns due to non-transparent ways of behaviour in the construction industry, for example, that are causing serious problems (Vos, 2002). In fact, these examples show one important thing:

- *The need for improvement of the construction process on both the client as well as construction industry's side.*

However, it should be clear that this means more or less a continuous effort to make improvements, during the process and life-cycle of delivered projects, for the construction industry is a dynamic business.

IMPROVEMENTS AND CHANGE OF THE CONSTRUCTION INDUSTRY

Based on the success of a project, the main activities in the construction industry are as follows:

- Design / Specification
- Preparation / Realization
- Use / Re-Use

These three activities are often divided among several parties, which mainly specialize in one or more of these activities, often leading to the focus on several types of organizations, e.g. *Traditional, Building Team, Turnkey,* etc. (Maas et. al., 1992). Without dwelling too much on details like types of organizations or contract-types, and 'buzz-words' like *D&B, DBFM*, etc., the main issue is still the following:

"How do we keep the customer satisfied?"

The 'customer' is an important factor because for different parties in the construction process, the word 'customer' can have different meanings, e.g.:

- The user / end-user of the project (e.g. from the viewpoint of the architect);
- Or the contractor (e.g. from the viewpoint of the supplier);
- Or the bank / investor (from the viewpoint of the contractor).

The role knowledge plays in the construction industry is described in more details in the following analysis.

KNOWLEDGE AS A PRODUCT OF ENGINEERING TRANSFER

Brain-Drain And Knowledge: The Risk Of A 'Brain-Dip'

The main concerns pertain to the use, re-use and probably the risk of abuse of the information due to developments in the Internet, IT, moblie phones and other forms of communication. However, there is another increasing problem of ensuring the availability of knowledge and this is often an under-estimated problem, especially in the construction industry.

As Schaefer described in his research, the elderly (and experienced) people are leaving the construction industry upon their retirement, resulting in a serious loss of the transfer of their knowledge and experiences (Schaefer, 1991).

Despite this developments, it seems that there is little effort to tap the experiences of these professionals during their active participation in daily projects or during the period before their retirement.

To solve the problem mentioned above, the *'Brain-Drain' approach* can be used, especially during the period before the professional's retirement. This approach is based on the following assumption:

- The employee who stops with his or her daily work can be of a huge value for coming projects in the construction firm!

In practice, the above developments often mean that there is the serious risk of a so-called *'brain-dip'*, created by the departure and replacement of the older employees by younger or new employees, due to the former's retirement. In figure 1, this 'brain-dip' is shown and related to the replacement period.

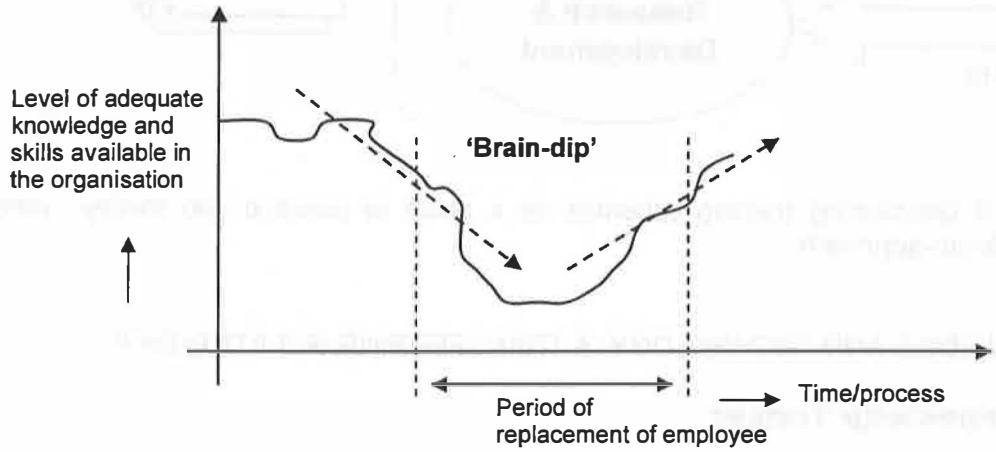

Figure 1 Schematic diagram of the 'brain-dip' due to replacement of employees.

However, to make the knowledge and experiences of departing employees available to younger/new collaegues, a systematic approach to transferring such knowledge and experiences should be stimulated.

Note:
Looking at the issues highlighted above, it should be emphasized that we mean the 'brain-drain' approach to be a positive way of using one's knowledge and experiences for future projects and processes in construction. It definetely does not mean the negative use of such an approach in dictatorial regimes, for example, where it is being used for 'brain washing', etc. And it also does not mean the threatening trend of 'academia' leaving the countries (developing), resulting in a decreasing level of know-how in those countries.

Brain-Drain And Training: Transfer Of Knowledge

In the modern construction industry, training activities are commonly used to transfer knowledge. Figure 2 shows that setting up and making improvements in training schemes are important areas in the use of the 'brain-drain' approach. This approach can serve to make practical experiences available for the development of (theoretical) courses or training schemes.

However, it should be noted that having training schemes or related approaches as described above requires training as early as possible because of problems related to keeping knowledge updated and making it available.

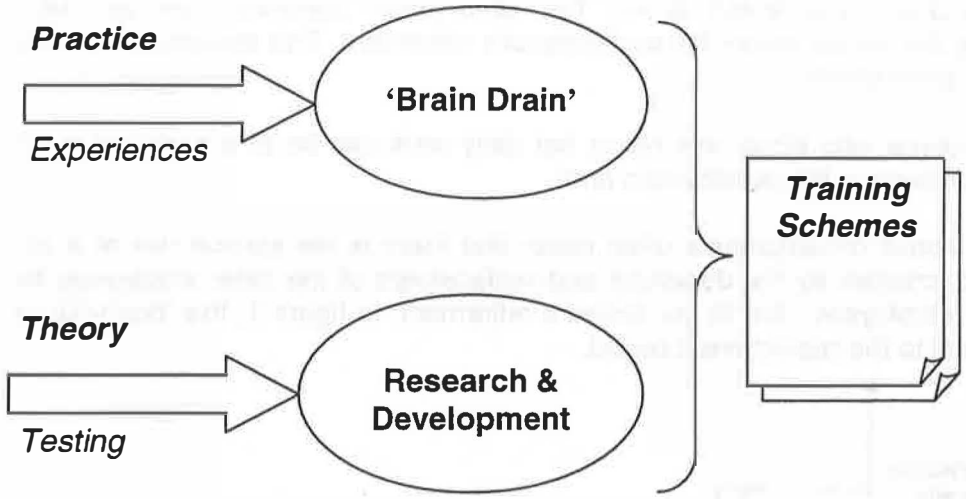

Figure 2 Developing training schemes as a result of practice and theory, using the 'brain-drain'-approach.

KNOWLEDGE AND TECHNOLOGY: A TRANSFERRING RELATIONSHIP

Using Knowledge Transfer

There is a need to develop and improve processes and/or techniques of getting the existing experiences transferred into knowledge, and making it available to others 'on demand'. The analysis of how to make a positive use of the 'brain-drain' approach indicates this need. Figure 3 shows the more or less the 'cyclic flow of knowledge' in a professional environment.

As should be clear from figure 3, the 'cyclic approach' uses the possibility of *continuous improvement* and *reflection* on present situations, *learning* from one's own or others' *experiences*, from the past and present, leading to skills and knowledge for the present and near future. In this cycle, the key-points are still the moments of 'transfer' of skills and knowledge, as they act as a system of 'transmission' and 'receiver' (hopefully without any disturbance...?!).

Therefore, positive knowledge-transfer is the basis for technology-transfer, as the (cyclic) list below emphasizes:

1. Transferring knowledge from (pre)retired employees;
2. (Re)-Developing and updating knowledge;
3. Using knowledge in daily practice;
4. Improving knowledge by adding practical experiences;
5. Making knowledge applicable in (systematical) technology;
6. Transferring technology to other areas, etc.;
7. restarting from number 1 again.

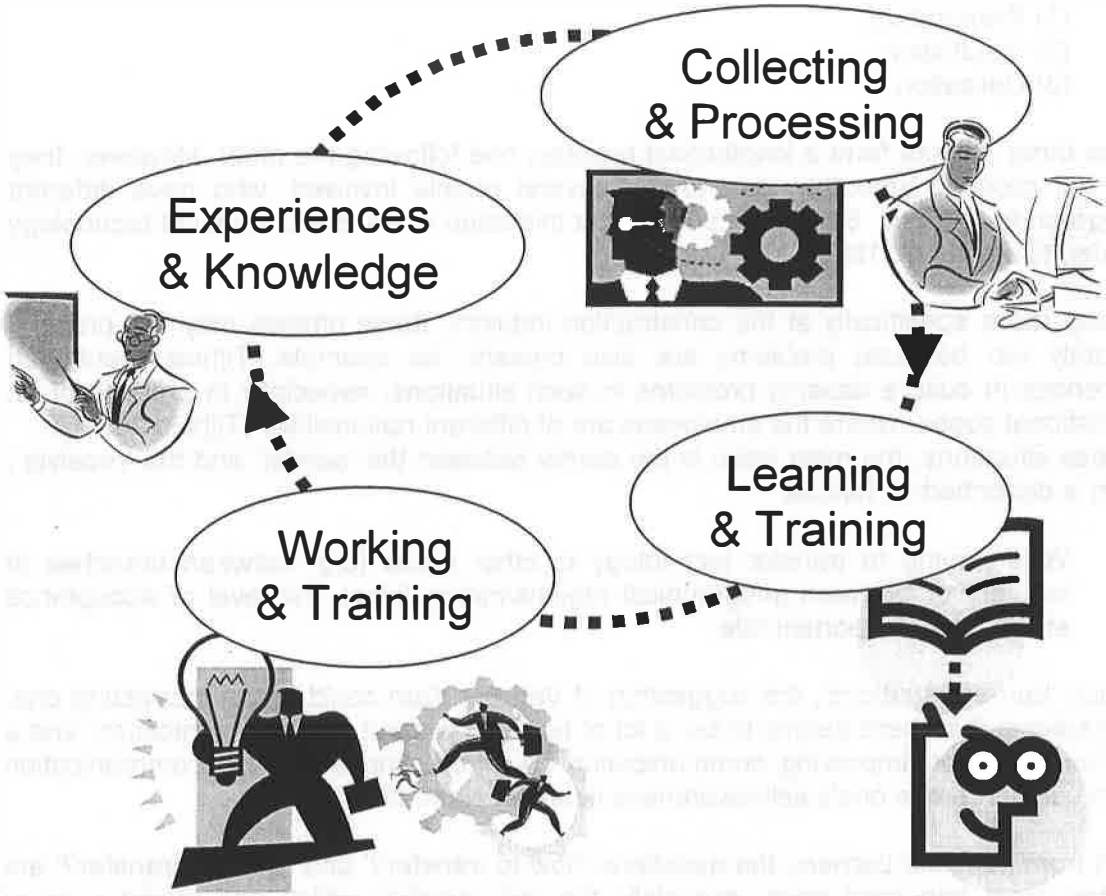

Figure 3 Schematic diagram of 'cyclic flow of knowledge' in a professional environment, consisting of key-points of 'transfer' of skills and knowledge.

Despite the above-mentioned role of knowledge-transfer, it still seems that industry emphasizes more the need for technology-transfer than for knowledge-transfer. However, in the universities and other training institutions, the last item in the list seems to be one of the main tasks and activities and here it differs completely from industry. As Barrett wrote: 'Researchers, particularly in the University sector, inhabit a very different world from those in industry,.....The difference is in the culture, funding and reward systems that are all oriented towards the production and transmission of knowledge' (Barrett, 2001). But the differences are not only a threat, they make people look from other viewpoints, combining others by *transferring* them between parties!

USING TECHNOLOGY TRANSFER

As a definition, technology tranfer means *'...to pass on inventions and innovations, experience and expertise, know how and technology to other persons or organisations'* (Dworatschek & Rucker, 1993). It has to do with individuals ('brains') and organisations ('structures'). The transfer process itself consists of three main phases, as Steenhuis distinguished them also in an example from a project-based industry (which the construction industry is, too) and the aircraft industry (Steenhuis, 2000):

(1) Preparation;
(2) Installation;
(3) Utilisation.

These three phases form a longitudinal process, one following the other. However, they may not proceed smoothly, due to the several people involved, who have different backgrounds or goals. Samli also pointed out this issue in his 'basic model of technology transfer' (Samli et al, 1985).

Looking more specifically at the construction industry, these phases may not proceed smoothly too because problems are also present, for example, Tijhuis mentioned differences in culture causing problems in such situations, especially in projects of an international scope, where the employees are of different nationalities (Tijhuis 2001b).
In these situations, the main issue is the *barrier* between the 'sender' and the 'receiver', which is described as follows:

- When trying to transfer technology to other areas (e.g. between branches of industry or between geographical regions/nationalities), the level of acceptance still plays an important role.

In such 'barrier-situations', the suggestion of Van der Kam could be an interesting one. He mentions that there seems to be 'a lot of listening without real communication' and a solution could be improving communication by introducing electronic communication which could improve one's self-awareness (Van der Kam, 2001).

Apart from possible barriers, the questions 'how to transfer?' and 'what to transfer?' are still the most important ones, especially the last question which has raised a lot of discussion related to the following (ILO/ASIST, 2000):

- On what level should one try to implement modern technology and labour-based working methods in developing areas?

However, it is clear that the education of students on average takes place between the ages of 18 and 22 and, after becoming employees in industry, their professional training and 'updating' of knowledge take place when they are between 22 and 65 (or even earlier) years old. In figure 4 this situation is presented schematically, based on the construction industry in The Netherlands.

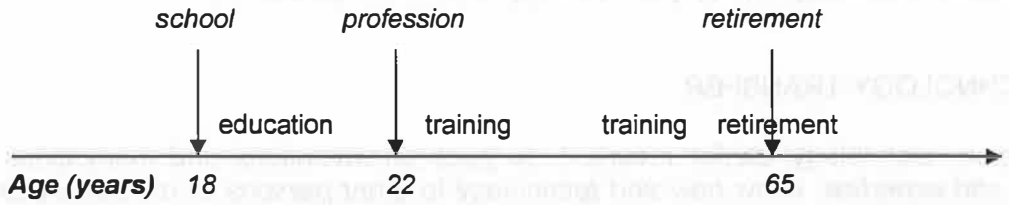

Figure 4 Time-schedule of education and training period of an average student and employee at the technical and management level in the construction industry in The Netherlands.

The above figure indicates also that the transfer of knowledge and skills of older employees to younger and new ones should at least take place before their 65th birthday, or at least before their retirement. Preferably, it should be even much earlier, as this process takes time. Therefore, this process should be well planned.

Although the transfer of technology still seems to be difficult in certain cases, especially between branches and/or between regions/cultures, one should be aware that it is not only one of the 'drivers' for improving local (community) development, but also one of the most important drivers for improving the construction process. However, to keep such improvements relevant training and improving the skills for handling the transferred technology should stay fully connected to the issue of technology transfer (Tijhuis, 2002). Technology transfer should be firmly connected to and combined with knowledge transfer, including training skills.

TRANSFERRING KNOWLEDGE BY THE 'BRAIN-DRAIN' APPROACH: A CASE STUDY

The Situation: Retirement Of A Manager

This case study is based on a larger database of background information, of which a part is described in this paper. The main focus is on the issue of knowledge transfer.

A company, active in the construction industry, had several employees who were almost due for retirement. As the management recognised that one of the managers would be retiring within one year, they made plans to recruit a new and younger manager. The P&O officer drew up the job description and recruitment advertisements, etc. The objective was to have a new employee who would possess the modern knowledge and skills needed for projects in the current market and near future. The person should also have good networks, hence, the replacement of the employee seemed to be a good opportunity for the company to refresh its existing knowledge and skills on one hand, but on the other hand, it is also meant a loss (partial) of social and business networks.

THE 'Brain-Dip': What Went Wrong?

The above approach assumed that the knowledge and skills of the older manager were 'old-fashioned', or 'out-dated' in the management's opinion. But is that really true? It described the change of the manager without any attempt to 'drain his brain' immediately. This will introduce the risk of a 'dip' in the level of knowledge and skills within the organisation. And in this case the dip could be steep and sharp.
Why is this so? During the 'replacement period' the retiring manager and the management could get 'frustrated' with each other about some retirement fees, or other problems which could lead to the retiring manager stopping all activities immediately. Furthermore this would cause an immediate loss of available knowledge and skills, creating a real 'dip'. Figure 5 shows this situation.

The 'brain-dip' was not the only problem. There also existed the problem of the almost immediate loss of social and business networks. Although these networks could be quite easily tracked by the data and CRM systems available in the company, the effectiveness of these networks would be reduced due to the need for rebuilding new personal contacts by the newly recruited manager.

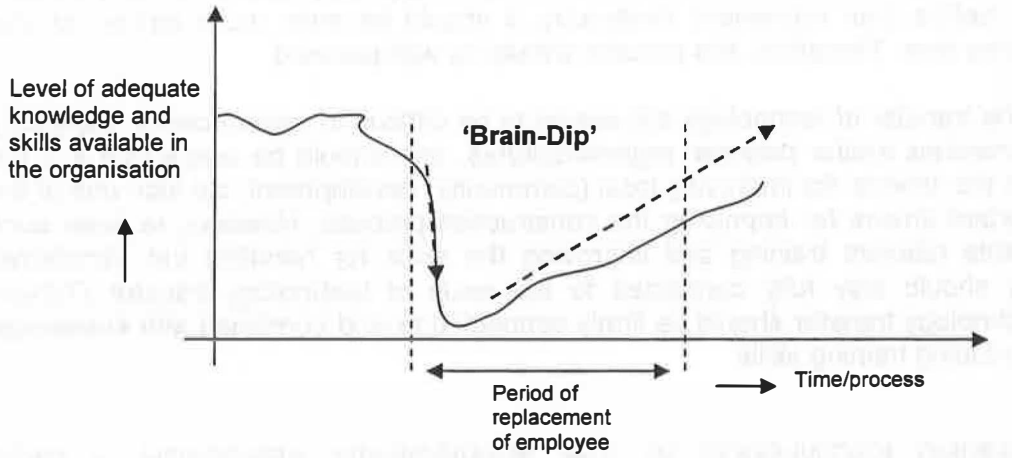

Figure 5 The existing 'brain-dip' due to the 'frustrations' and immediate non-active status of the retiring manager.

All this indicated that the company had not thought seriously about preventing the risk of a 'brain-dip' in the departure or replacement of employees. In other words:

- They were too late in recognising and valuing seriously their employees' knowledge and skills.

And this risk, besides costing them a large amount of money meant that the company continuously bore the risk of losing its competitiveness in the market. It had been very 'static' within a very 'dynamic' world of 'job-hopping' employees. Another trend was the increasing average age of employees, due to the increasing number of retiring employees, and this was obviously not replaced sufficiently by younger experienced ones. A point to note is: *losing an employee is losing a part of the market*, while the employees' networks are a company's market, especially if they are management employees, as in this case!

Lessons Learned

The case study, supported by a large database of background information, resulted in the following lessons:

1. As the market of 'job-hopping' employees is a very dynamic one, and the average age of employees is increasing, a company should have a dynamic approach towards the improvement of its level of knowledge and skills, and ensure that it is able to keep them updated sufficiently for daily use.

2. 'Real life' companies (especially those companies, which are not just 'virtual' or 'dot.com' companies without any personal contacts) should pay serious attention to the 'value' of their employees.

3. In addition to the above lessons, companies should also value their employees' personal and social networks, as these networks play a key role in the business, and in a 'dot.com' economy! (see Tijhuis, 2001a).

DISCUSSION AND CONCLUSION

The following points listed below are based on what were described in this paper:

a. The discussion of using the 'brain-drain' approach in the transfer of knowledge and technology could be compared in parallel with the process of making and maintaining a 'back-up' in the software industry. This approach can be considered for part of the networks and contacts of employees with the help of the CRM or database system. In fact, it is 'draining' the knowledge and experieces of the (retiring) employee.

b. However, for 'draining' the brain of a retiring employee, this technical approach still introduces more difficulties. Think of the willingness of the employee, or the lack of 'structure' in his way of thinking, etc. Although 'structures' could be offered by expert-systems (e.g. neural systems, fuzzy logic, etc.), the most important issue is still the following: Does the employee really see the advantage (or disadvantage) of not accepting the 'brain-drain' approach?

c. Given the fact that the 'brain-drain' issue is important enough for the company to discuss it with its employees, it would be better to integrate this issue in their daily work on a regular basis, instead of focussing on it at the end of the employees' career. This may help to improve and maintain the good relationship / network between the company and its employees, even after their retirement. The structure and function of 'alumni-networks' in the academic world could be a good example of such networks, or do academia and the construction industry also differ in these issues and experiences?

Apart from R&D efforts in industry, there should also be more emphasis on the B&D (Brain & Drain) approach. Then a continuous improvement of knowledge and experience can be established and assured, and it keeps the social and business networks updated in the construction industry.

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