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Common Sense Approach To Third Level Education For The Modern Market

Dr. Mohamad Saleh

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Dr. Mohamad Saleh
School of Informatic and Engineering
The Institute of Technology Blanchardstown
Road North, Balanchardstown, Dublin 15

Mohamad.saleh@itb.ie

Abstract

A healthy industry is of crucial importance to the well being of a nation. Recently, new technology has caused tangible changes in the modern market by creating continuous needs and demands for skills and technologies in various fields. The educational system is a major component in the provision of the skilful workforce in a society. However, the recent unprecedented rate of industrial expansion has resulted in new industries experiencing recruitment difficulties. It is felt that these issues can be addressed by establishing reliable collaboration between industry and third level educational systems to fulfill the needs using less resources.

This paper is an attempt to examine the mechanism of probable future industrial needs for skills and technologies with some focus on the response of the third level education towards these needs.

1. Introduction

In recent years, there has been a manufacturing quality revolution, which began with Taylor around 1920 and the division of labour. Then Schewhart developed the Control Chart. They were the dominant manufacturing force in the world and concentrated on the "product out" rather than the "market in" situation. The Japanese then embraced their ideas and ironically with Deming and Juran (both American) and home grown talent (Ishikawa and Taguchi et. a!) they developed today's Quality Concept which are based on Total Quality Management (TQM), and "market-in". Due to these concepts the manufacturing industry has gone from strength to strength.

Total Quality Management (TQM) is a philosophy of never-ending improvement achievable only by people. This has grown from the view that quality cannot be "inspected in" to a

product or service. The essential feature of TQM is the improvement of quality, which depends on the attitude of the workforce. In this context, the quality improvement in any organisation must be the responsibility of every member of the organisation. Thus, Total Quality Management is inseparatible from general management practice.

Manufacturing process can be the act of providing something, which somebody wants. Therefore, the educational system is no different from a manufacturing process. However, this system is at present falling behind the manufacturing system with regard to quality within its industry. Thus, in order to progress, it is felt that the educational system should adapt the concept of TQM, similar to that used by the manufacturing system, to respond to the new development and indeed to survive in the modern market place.

At present we are living in a world of manufacturing goods where information technology-based manufacturing is often described as the second industrial revolution. The first industrial revolution brought about the invention of mechanical machines that delivered unparalleled power. Today's industrial revolution, however, is all about processing machines that deliver brain power, and the precision in manufacturing industry. In fact, this has been associated with significant changes in the market for the buying and selling of industrial and consumer products across the globe. Consequently, the relationship between the manufacturer and supplier is now faced with dynamic changes. Therefore, special qualifications and skills are needed for these new developments in the industry. As a result, this influences industrial long-term requirements for the education and training of its employees. Opinion about the impact of the present and the future developments in manufacturing industry diverge widely. In this regard, predicting the exact nature of the future of manufacturing education with any certainty is difficult [1]. However, the future of manufacturing will most likely be a smaller workforce with a higher-order of multi-disciplinary critical skills in management and labour processes to respond radically to the opportunities and constraints that will arise in the market [2].

Competence in the optimal use of information and communication technologies, supporting a global co-operation of enterprises, will be the future key to industrial countries remaining competitive, in both the race to bring new products to the market and sustaining a profitable presence in that market [3]. The multimedia communication services and electronic document systems have great influence in the management of technical documentation within the modern factory [4]. The development in computer-integrated-manufacturing (CIM), and the subsequent appearance of new methodologies and concepts such as World Class

Manufacturing (WCM), Total Quality Management (TQM); Just-in-Time (JIT), Material Requirement Planning (MRP) and Concurrent Engineering (CE) in the automated factory have caused great emphasises to be placed on the integration of the physical and intellectual capabilities of employees [5]. In addition, research and development could be conducted in control of monitoring discrete event systems like Flexible Manufacturing System (FMS) in conjunction with neural networking [6]. Micro-technology might be the determining factor of advanced manufacturing technology in the immediate future. The development of new types of miniaturised and micro-robots with human-like capabilities will play an important role in different applications and tasks [7]. These issues, in recent years, have had a significant impact upon engineering and engineering education in terms of the knowledge and skills required to develop quality market orientated products from a wide range and variety of complex engineering systems. Thus, the interface between industry and education and training is becoming increasingly complex [8]. The growing awareness of the critical importance of Lifelong Learning is likely to change professions and its whole approach to 'qualification' [9]. It has been pointed out that the developments in science and technology have created new interfacial disciplines. These disciplines could be the areas where Lifelong Learning could be in greatest demand [10]. This paper discusses a practical module of industrial training and education at third level in relation to the requirements of modern technology.

2. Third Level Education and Industry

The old style education systems were evolved along three direct traditional lines:
Humboltian, Napoleonic and Anglo-Saxon. These traditions are centuries old . The difference between them lies in where the power resides. In the Humboltian tradition, found in much of Europe, the faculty is very strong, the central administration is weak and there is little government interference. In the Napoleonic tradition, found in France, Poland and Russia, the government has powerful influence and the institutions and faculties are subservient to it. In the Anglo-Saxon tradition, found in the United Kingdom and the former British Colonies, the University's Central Administration has responsibility for the institution, it has control over the faculties and operates quite independently of government. In the latter half of the Twentieth Century, new institutions of higher education have been developed. These have a less scholarly focus and are directed towards the employment market. These institutions have developed within the academic tradition of the nation. Therefore, the power repository in these new institutions is similar to that of the old traditional universities.

In the later half of the 20th Century, new institutions of higher education were developed. These have a less scholarly focus and are directed towards the employment market [11]. A frightening statistic is that in 'some fields', 20% of an engineer's knowledge becomes obsolete every year [12]. This suggests that the globalisation of engineering education requires further characteristics for the modern degree programme. To meet the challenges of the 21st century, universities must become learning organisations which are skilled at creating, acquiring and transferring knowledge, modifying their behaviour to reflect new knowledge and insight [13]. It may be that as access increases into undergraduate courses, postgraduate schools will become the place for higher education [14].

Our society has many groups with legitimate interests in third level education. Thus, the quality of third level educational systems has a considerable influence on the economic well being of a society. Accordingly, the ability of a country to attract industrial and commercial investment is dependent on many factors; the availability of an educated workforce is among them. Therefore, the level of investment and the range of activities, which international organisations bring to a country, are very dependent on the number and quality of the country's graduates. Countries with weak third level educational systems attract labour-intensive, low-knowledge industries; whereas those with strong third level educational systems attract high-value, knowledge-based industries. So, the relationship between the third level educational

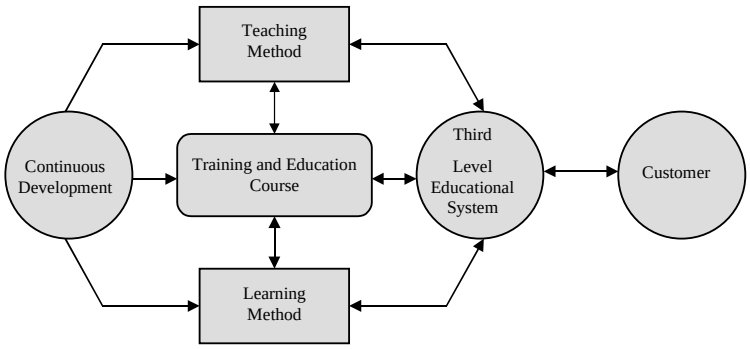

Figure 1.

system and society can be defined based on the customer-satisfaction pattern as shown in Figure 1. This suggests that the third level educational system should forecast/evaluate the needs of the customer and accordingly provide what is required to fulfil them. This can be achieved through appropriate course and methods of delivery with a Lifelong Learning process for lecturers/staff members and students. In this respect, the third level educational

system plays an effective role in knowledge transfer and provision of the required skills in a society.

3. Industrial Training and Education

The technological, economical and political changes around the globe have brought about a new scheme of industrial training and education. As a result, eemployees must now be able to learn as quickly and effectively as possible, using the available resources as efficiently as possible. However, the level of employee developments varies according to the regional economic situation in the world. During 1980's, many books and articles lauded Japanese employee development as a key factor in Japan's economic advantage over the United Sates and other countries. Accordingly, firms around the world adapted Japanese management practices, heeding dire warnings that companies that failed to do so would fall quickly behind in the competitive global economy [15]. In Asia, the current crises and the attendant business down-turn caused a hard stance within the business and financial communities to cut waste and create greater efficiencies. According to Korea's Human Resource Development Magazine 70% of survey respondents had cut their training investments 12.5% by June 1998. More than 16% responded that their training investments remained the same for 1998, and 11.4% said their training investments had increased from previous year [16]. Due to the economic growth in Ireland, the Government established the business, education and training partnership in late 1997 to develop national strategies to tackle the issue of skill needs, manpower needs estimation and training for business [17]. Subsequently, there was a novel pilot project set up between the IT (Institute of Technology) sector in third level education and the national/multinational industry in Ireland for training and education.

Employee learning can be planned/formal or unplanned/informal. Formal learning is referred to as training in the classroom-based, instructor-led training. Informal learning occurs in a company during such activities as team and customer interactions, meetings, cross-training and shift changes. Both formal and informal employee learning could be either under or outside control of the employer. Estimates from several recent reports suggest that most of what the U.S. employees learn occurs informally. The Bureau of Labour Statistics reports that in 1995, employees who worked in firms with 50+ workers received an average of 44.5 hours of formal and informal training during a six-month period. Of that total 70% occurred formally; the remaining was formally outside the control of the employer. On the other hand, the best evidence suggests that employees of Japanese firms also obtained much of their learning informally, but the proportion is substantially smaller than the US figure of 70%. It is estimated that the international percentage of employees receiving training is 75.5% in

Europe, 68.9% in Canada, and 67.3% in Japan respectively. It has been found that employees value training, they will be more loyal to a company that provides it – a fact that attracts the budget-focused eyes in any organisation. Also this enables the company to create the kind of employees it wants [18].

4. Model for Industrial Training and Education

As technology is changing so fast, it does not take long for existing skills to become obsolete. As a result, this makes the market a very competitive labour place. Therefore, it is imperative that third level education, in conjunction with the industry, provides all the necessary tools to attract candidates/employees to keep abreast of the new changes in technology to enable them to build on their skills. This can be achieved by means of strategic collaboration between third level education and industry through research and development and Lifelong Learning as shown in Figure 2. The following approach is based on our recent experience in training and education towards addressing the technical engineering skills. This model can be adjusted to a great many situations for running training and education like a business.

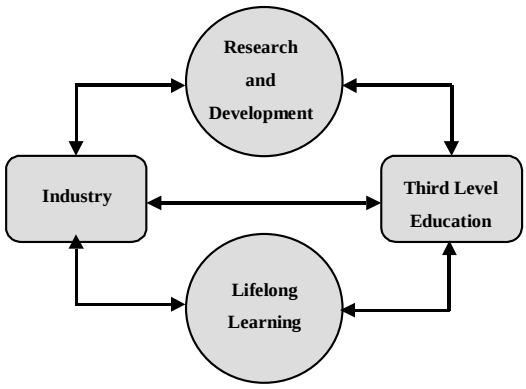

Figure 2.

5. Course Strategy

The main steps in designing a training and educational course for industry are:

(i) Define the present and the future requirements based on the nature of the industry.

(ii) Organize resources available for the course.

(iii) Set scheme for entry and assessment based on the quality assurance benchmark.

(iv) Establish/adopt the teaching method and course contents based on immediate requirements and the focus technique .

(v) Provide a measure for the overall delivery cost.

(vi) Provide a reliable database of information based on give and take information.

(vii) Establish a course management.

The Human Resource Department in the relevant industry should be approached by the third level educational institute to discuss and agree the terms and conditions.

6. Course Costs for Delivery

Costs form the very core of most business people's concept of efficiency. Yet few businesses are even aware what their true training costs are because, in most companies' budgets, many training costs are in effect hidden from the line item covering training expenditure. In fact, only a fraction of the true costs of training are visible in most organizations [19]. The average international expenditure per employee rises to US$960 in Europe, US$531 in Canada and US$579 in Japan respectively [15]. This training expenditure is taken as a percentage of the payroll of the employees.

5. Conclusion

Overall, a successful industrial training and educational program must be flexible, with confident collaboration and reliable give and take information needed for all involved.

Third level education should reflect the rapid change in manufacturing technology. This can be accomplished by the 'market in' approach with strategic links with industry. Course delivery and the learning process should be based on the extensive use of computer technologies and on multimedia communication. This should be based on the teamwork concurrent delivery method rather that sequential method. In this sense, the educational model at third level education will be more like the medical school model where lecturers practice, coach learning and do research. However, it is hoped that the new trend in this education will be balanced between academia and industry.

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