IMPORTANCE OF TRAINING, LEARNING AND EDUCATION FOR TOTAL QUALITY MANAGEMENT (TQM) IMPLEMENTATION

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ABSTRACT

Since the concept of Total Quality Management (TQM) was launched in the western world in the early eighties, a large number of organisations of all types and backgrounds have attempted to implement it in order to regain or maintain their competitiveness or even survive in a drastically changing business world. Some of them have been very successful whilst others have had rather poor or null results. In parallel with this, training has become something of an issue, in this decade, due to the rapid growth of technological innovation and development. It has been observed that, before trying to implement a TQM initiative, the concepts associated with training such as education, learning, transfer, retention, and how they are related have to be clearly understood in order to achieve success. TQM implementation requires specific training and if the importance of this is not properly appreciated and undertaken in particular circumstances, the consequences of the implementation could be disastrous. In this paper the concepts mentioned above and how important is to have a profound understanding of them, before initiating the application and implementation of TQM, are analysed. Likewise, the impact that technology has had on training is also discussed.

1. INTRODUCTION

Total Quality Management has been one of the cornerstones of business success since the Quality concept was first launched in Japan in the 1950s. Since its inception, a large number of organisations of all types and backgrounds have attempted to implement TQM in order to remain competitive or even to survive. Some of the TQM efforts have been very successful, a fact reflected in their returns within a few years of implementation. Many others have not been so fortunate and have not yielded the expected results that this philosophy of continuous improvement had promised.

In order to be successful in TQM implementation, training plays a big role. Disregarding periods of recession when everything is cut back, many organisations have poured more money into training initiatives, realising that if they do not, their operations and processes will not be efficiently performed, resulting in a total waste of valuable resources. The application of the TQM philosophy, with all its complex tools and methods, will not be effective if it is not supported by proper and dynamic training actions; it will very probably lead to total failure. Conversely, when TQM implementation is supported by a sound training initiative, success will come sooner and easier; however, before the development of a training programme, the training philosophy has to be clearly analysed and understood.

Unfortunately, there are still many organisations which do not have a substantial understanding of the whole training endeavour; even those who invest heavily into it. Many of them still consider it as merely a series of short courses, seminars, speeches or even hands-on activities totally divorced from a structured plan or strategy. Others believe that training is important but do not seem to do anything to implement it. Lorenz [1] affirmed that "almost 75% of small-firm owner-managers believe that training is vital to the success of their business but only a third obtain training before starting up." In addition, the training is very often carried out by inexperienced beginners whose best intentions are insufficient to comply with the minimum training requirements of the particular organisation.

TQM implementation requires well-trained and highly motivated work teams, and quality training requires a sound system, qualified trainers, solid training materials and methods, and emphasis on training from the top down [2]. The objective of this paper is to emphasise the importance and understanding of the different concepts of education, training, learning, transfer, and retention prior to initiating any TQM implementation and training effort.
2. TRAINING, LEARNING AND EDUCATION

Training, learning and education in general, have become an issue in this decade due to the rapid growth of technological innovation and development. Managers currently have to cope with new working environments, more competition and the pursuit of a higher market share. This situation creates the need not only to increase employees’ skills and update their capabilities—technical, managerial, etc.—to enable them to meet the new demands of their jobs, but also to improve their learning capabilities at the same time as motivating them to enhance their general education. It is through training that these capabilities are transmitted to achieve the results; however, the learning process also plays a very important role in the acquisition of such capabilities; therefore, it is very important, when training and education form part of the business strategy, to understand how the learning process takes place.

3. TRAINING

Training is a service function [2] and good training practices are becoming a necessity for organisations that wish to perform well. One of the most important resources that any company possesses is its employees, however if they lack the necessary training and development skills this resource is wasted. An employee’s work is the main factor that contributes to creating products or services; without workers, the material resources which a company may have, even if they belong to the latest state-of-the-art technology, will be worthless. The employee’s competence is a very important factor for determining the objectives that such a company can set for itself, and, in order to have this, the employees need to be trained and given more education. Learning is a vast subject that is linked to training and education, and so the author considers it important to comment on its principles and the role it plays. In the present world of rife competition, training and education are becoming very important in order to succeed and survive, and as long as the learning abilities of personnel in organisations are improved, these efforts will be more cost-effective giving a quicker return on investment. Each of the three aspects will now be discussed individually, and then they will be brought together at the end of the article.

3.1 Training Evolution

Training means “the development of new skills, knowledge or experience and this has to be done with theories or principles of learning and skills acquisition” [3]. In other words, training is a tool for helping individuals to learn how to carry out their jobs in a satisfactory manner. The
Department of Employment’s Glossary of Training Terms [3] defines training as the systematic development of the attitudes/knowledge/skill behaviour pattern required by an individual in order to perform adequately a given task or job. Goldstein defined training in a simpler manner as “the acquisition of skills, concepts or attitudes that result in improved performance in an on-the-job situation” [3]. Even though it can be affirmed that training involves learning a task by doing it either one or several times, it does not necessarily mean that this repetition is going to guarantee the full acquisition of the skills and/or attitudes, as it will be analysed afterwards.

Whether the training is of a basic or more sophisticated nature, depends upon the quality and scope of the job to be done, but the definitions given allow one to understand the meaning of training, which is a response to the question for example, “what does a person need to know in order to function as an employee of this firm?”

According to Kenney et al. [4] at one time, workers did not need many qualifications for carrying out simple tasks or even some of the more sophisticated ones. Perhaps the most important qualification was only to want to carry them out. The learning process was mainly hands-on, generally disregarding the characteristics or profile of the individuals needed for the job, their abilities, etc. Nothing else mattered but to complete the task. Training was an "unknown" word and as Sheldrake and Vickerstaff [5] pointed out, "the most important thing was to have the job done at the cheapest rate." This was true many years ago, but unfortunately, it still applies nowadays in many organisations. Management try to lower their prime costs in the face of training, overlooking more important aspects such as, if they train their people, they would definitely be able to reduce their overall costs in the medium run due to a better and more efficient productivity.

Before the Industrial Revolution in England², the main focus was to produce as many goods at as high a rate as possible often stretching to their maximum the capacities of both the machines and the operators. It was this Revolution that forced industry to become concerned with training [4]. As was apparent in the period 1870 to 1914: apprenticeship was not the only means of acquiring skill . . . it was the single most important [6]. A typical apprenticeship ran for five to seven years, and the employer knew that more had to be given in the way of training, than the apprentice gave in terms of production. The type and quality of training varied according to the type of business or shop.
The First World War revolutionised the possibilities of training since the demands of wartime production required that both men and women should learn, as quickly as possible, about certain activities and operational techniques in order to comply with the high demand. Training was then conducted in Technical Schools, in Instructional Factories, and in Instructional Bays attached to particular works [5]. From this period, it can be said that training in general was taken more seriously and had a more formal structure which contributed to improving the training skills of workers, although that structure could not guarantee the effectiveness of such training endeavours.

The Second World War dissipated the industrial stagnation of the years of peace between the wars. The British Ministry of Labour, which at that time was responsible for training schemes, became a key element in the conversion of industry from peacetime activities to armaments production. Subsequently, Government Training Centres were created and by 1941 [7], almost 75,000 people completed training courses in these centres; but according to a report of the Select Committee on National Expenditure, the courses were too long, general and theoretical. What the employer wanted was someone able to set up and work a particular kind of machine, not somebody with a little experience of several different machines. Even though the Second World War was a landmark for training policy, there would still be many years before training took the status and importance that has today.

From this time, training evolved following years of relative economic boom and almost full employment. It was at this point that companies started to wake up to, and become aware of, the need to adopt a systematic approach to employee training, education and development. Personnel management evolution became in a major business function and resulted in a better and more efficient use of human resources. It was in the eighties and nineties that training was taken more seriously and given the real profile that it must have in any organisation. Since competition plays a very important role in trade, industry, business and companies have to achieve excellence and upgrade their training systems. At the same time, they need to keep their costs low if they want to become more profitable or even survive. As a result, training became a key issue at the end of the 20th century.

3.2 Types of Training

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2 Country taken as a reference due to its development on the training issue by those times
The types of training given to individuals can vary from one organisation to another, depending on which one will better suit their needs. Some of them believe in training through involvement while others apply taught training using the traditional methods of board and chalk or, in these modern times, screen and keyboard. They will also depend on the different levels or hierarchies within the organisation. For instance, considered as general training, the mission statement and objectives of the company should be completely understood by all members from the top down. Specialised training, such as that in quality tools or techniques should be given to certain employees according to the requirements of their jobs. Every organisation will have to decide what is considered general or specific training; however, it can be split into two main types [4]: Unsystematic and Systematic.

**Unsystematic training.** The main features of this type of training are:

- it is not an integral part of the company’s operation;
- it has a low priority in the company’s policies and working methods, leading to employees being responsible for their own training (just enough to cope with their duties but no more);
- and generally, when it is a question of managerial skills, managers are appointed for their technical background and abilities leaving them to obtain the necessary managerial skills as they go along with almost no help.

The main belief is that by having this sort of unsystematic training, organisations save money since it “is not expensive”; nevertheless, this is only superficially true, since there are many hidden costs such as lost production hours, longer learning times, poor utilisation of machinery or damage to it, work done wrongly, etc., which are very difficult to estimate.

**Systematic training.** This can be defined as: identifying the sort of training needed, planning the appropriate training programmes, implementing the training ensuring that employees have enough assistance to learn the skills embodied in the training goals to gain in efficiency, and evaluating the effectiveness of such training programmes in order to improve them in the light of experience. Figure 1 depicts this type of training.

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Step 1 Identify what training is needed
Step 2 Plan how to meet this need for training
Step 3
Step 4 Check the effectiveness of the training
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This four-step sequence for training can be applied at all levels of an organisation, even though there may be variations in the training requirements.

Step 1. **Identify what training is needed.** This step involves an analysis of the work and activities related to the job(s) in order to determine the expectations of the personnel, the identification of the difficult parts of the job(s) where errors may be costly. This analysis provides the objectives for the training programme as long as it emphasises standards of performance for the personnel or trainees.

Step 2. **Plan the training programme.** At this stage it is necessary to decide how to meet the needs of the training requirements, taking into account the policies of the company and possible limitations or constraints. The programme must specify the skills and knowledge required, the timetable or schedules, the training venue(s), and the resources needed to implement it.

Step 3. **Implementing the training.** Based on the programme, the training is carried out, making any necessary adjustments in the most efficient manner. Due to the different learning abilities of the trainees, there will inevitably be differences in their absorption rate, and subsequently in the length of time needed. Keeping records in order to control and make the necessary corrections to the programme are essential at this implementation stage.

Step 4. **Evaluate the effectiveness of the training.** Line management, the training officer and when suitable, the trainees, will carry out a radical revision of the programme in order to make the necessary changes leading to as full an improvement as possible. Everybody's experiences should be taken into account.

This general Model of Systematic Training Process is used in the Standard ISO 10015:1999 [8] which dictates the international guidelines for Training from the ISO family.

Systematic training itself can be of two types: **On-the-job and Off-the-job.**

**On-the-job training** refers to that given to those individuals who already have a job either unskilled or skilled. In this instance, the trainee is already assured of a job and consequently a wage, so he/she does not have to be concerned about finding a job after the training. This on-the-job
training is made more feasible if there are enough employees who can be appointed as instructors to teach the trainees. This type of training generally involves learning by doing but it does not necessarily mean that it is better than the following type.

Off-the-job training is not only relevant to the individuals’ abilities for a specific job but rather it encompasses a wide range of theoretical knowledge, communications skills and sometimes a general education in other subjects. This expands the individuals’ aptitudes and, consequently, would enable them to carry out any job more efficiently. This type of training can be carried out either at the work place, in classrooms, factories or skill centres. One of the main advantages is that many trainees are able to attend because of the flexibility of such courses. The main disadvantage is that the courses can be very expensive due to the equipment required, while there is no guarantee of employment once the course ends.

A type of training which could fit into either of the two groups is Accelerated Vocational Training (AVT) [7] which was designed to help adult workers to acquire, in just a few months, the knowledge which would fit them for positions requiring a certain level of qualification. The main features of AVT are [9]:

(i) It was developed after the Second World War and was intended for the re-absorption of the unemployed who had to learn how to build peacetime goods instead of armaments.

(ii) It was designed to solve the problems of short or medium-term employment.

(iii) The average length of courses is six months.

(iv) It has generally been developed in basic manual crafts, building and metalwork.

Training should apply to all levels of the organisation, from top management down [10]. Kenney et al. [4] affirmed that "many companies still have very poor training standards and do not satisfy the minimum training requirements", and the author, based on his personal experience, thinks that this statement is still valid for many organisations. Without training an organisation will be at a great disadvantage. Technological changes in design, processes and improvement in products due to higher customer requirements make training and retraining a necessity. The majority of companies staffed by poorly trained managers and workers produce, as a consequence, low quality goods or services [11]. Conversely, well trained managers and workers will produce goods or services of a much better quality.

As long as people receive training, organisations (management mainly) will be able to better use the talents of employees, resulting in product innovation and better products. The capacity to continuously update the skills of the workforce is a key factor in the process of
industrial restructuring at any level. Organisations want to acquire skilled employees, which can be achieved by either recruiting new personnel or upgrading the skills of existing ones. However, skills tend to have a short shelf life, making it necessary to develop and increase the existing skills of staff. As employees become more skilled, they are of greater value to an employer.

Employee development is about attitudes or motivation, working relationships or teamwork and skills; the trained worker is more committed and open to change. Nevertheless, the aspirations of the employee must also be analysed, they may have nothing to do with their actual or current jobs and the employer’s perspectives. To understand an organisation, employers hope that employees will acquire a clear understanding of how their jobs fit in with a broader perspective. Employers and employees working as a team should be involved in the decision-making and problem-solving processes, which are the keys to improving the organisation.

Another part of an employee’s development is in his/her education; training and education go hand in hand, as was established in the report “New Framework for Labour Market Policies” developed by the OECD (Organisation for Economic Co-operation and Development) [7]: “Effective job training depends upon a strong commitment by employers and the co-operation of employees; it also depends upon every worker having acquired a sufficient foundation of general education”.

Education and training should be widely available not only for organisations but also for individuals. Learning by those individuals, on the other hand, is a very important process for training and education effectiveness. It is not just a mechanical task since it embraces creativity, openness to new ideas, and the capacity of individuals to make sense of unknown or new situations. The concepts of training, education and learning are related and the three of them will improve the final product or process. They, as a system, are only part of a larger system; therefore, how employees learn becomes a very important aspect.

4. LEARNING

Learning is a very important activity and for certain individuals may be a rapid process whilst for others it is slower. During the life of individuals, learning becomes a dynamic process rather than just a passive acquisition of skills or knowledge.

There are many definitions of such an activity, for example, Patrick’s [3] which is that: “Learning refers to the change in a subject’s (person’s) behaviour or behaviour potential to a
given situation brought about by the same subject’s (person’s) repeated experiences in that situation”. Learning can also be defined [3] as “an involuntary activity or process that takes place from birth to death as part of the interaction between individuals, society and their environment”

Burgoyne [12] used the term learning based on *the performance of a good team is greater than the sum of its individual talents*. He defined three “degrees of learningfulness in organisations”:

(i) An organisation which remembers and reproduces its procedures (e.g. a bureaucracy).
(ii) An adaptive organisation which can “change to meet the changing demands of markets”.
(iii) Organisations which can “develop their context” in a way that assists “the development and enrichment of the organisation’s stakeholders, resources, trading partners”.

Learning in organisations, Burgoyne says, should enable individuals to adapt to their environment and to change under circumstances but giving them, at the same time, the freedom to develop as authentic individuals in relation to such an environment as this will tend to create in them self-confidence, auto-reflection, and a strong advantage in learning more about their own jobs and somebody else’s as well. Knapper [13] classified six types of learning: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation.

**4.1 Learning Models**

Charles Handy in his “wheel of learning” [14] shown in Figure 2, describes the learning process as starting with a question, a problem to be solved, a challenge to be met; and questions need possible answers, speculations, ideas and theories.

![Figure 2 The Wheel of Learning (Lessem [14])](image-url)
However, these have to be tested in reality; some will work and some will not, and until the employee knows why, he/she will not have learnt. In other words, the practical application of these four terms is not simple and it is required that they are perfectly recognised as the main contributors to the learning process.

The main attribute of this wheel of learning is that it has a formal and easy way of asking questions, seeking out theories, testing them and reflecting on them.

Additionally, education and training transform teaching inputs into learning outcomes. Forrester et al. [11] showed a bipolar model of the education-training process (Figure 3).

![Bi-polar Model of the Education-Training Process](image)

The model represents those aspects of learning-training with a relatively passive adaptation of the individual to the environment by introducing the element of socialisation, which becomes vital since the human factor is involved.

Training activities require a good understanding of how people acquire new skills or adapt to old ones since the learner is no longer, or should not be, a passive individual but rather someone who is able to create new ideas and data in order to understand a new task; therefore, training has to be more focused and engineered from a cognitive point of view.

Due to new changes in technology or procedures, deployment of personnel or simply the refreshment of skills, efficient learning becomes a must. The knowledge that people have about their jobs is very important, and most people have a lot of potential for developing their skills in the organisation for which they work; therefore, skills acquisition and learning play a very important role in releasing people's potentials.
It can be added that, as long as organisations decrease the number of their employees they ought to create and develop different strategies in order to cope with the loss of skills attached to these diminishing actions. One of them is the Lifelong Learning strategy which gives emphasis to having continuous employee skills development [15]. This strategy developed due to the increased tendency for jobs to be maintained. It aims to engage most, if not all, of the workers from any organisation into both informal and formal training on a regular basis.

4.2 Skills Acquisition and Learning

In current times many jobs have been partially or completely automated, thus the need for motor skills has been replaced by the requirements of supervisory tasks, monitoring, and problem solving skills (which imply more knowledge). The results is that an operator in a manufacturing industry assumes a supervisory role which involves monitoring the manufacturing process and intervening “only” when problems arise, and this often results in an insufficient or poorly solution. Therefore, the relationship between the practice and improvement of skills has fundamental importance in designing training programmes, and the learning abilities have to be taken into account for this programme’s design.

At the beginning of the training sessions learning is, or can be, fast. However, more and more practice is needed to achieve the same improvement later in the process. In other words, initial improvements in performance are fairly quick, but from practical and financial points of view, the return on investment is rather low. During any learning process, improvement diminishes as training practices continue. Learning curves help to better understand the learning process.

4.3 Learning Curves

A learning curve (Figure 4) shows the relationship between total direct labour per unit and the cumulative quantity of a product/service produced, i.e. experience vs. productivity [16]. As long as more units are produced, the process time diminishes making the learning characteristic flatter.

![Learning Curve](https://example.com/learning_curve.png)

Figure 4 Learning Curve
(Krajewski and Ritzman [16])
Learning curves were developed before World War II for the aircraft industry when it was discovered that the direct labour input per aeroplane declined with considerable regularity as the cumulative number of planes produced, increased. Learning curves enable managers to project the manufacturing cost per unit for any cumulative production quantity. They are very dynamic because they are affected by various factors such as product complexity, replacing of labour by automation and capital additions, and are certainly affected by TQM and continuous improvement. They may be used for: a) estimating labour costs when preparing bids for large jobs, since they are based on the learning rate, the number of units to be produced, and the cost of labour; b) for financial planning in determining the amount of cash needed to finance operations, comparing prices and costs; and, c) to project labour requirements, to estimate training requirements and to develop "hiring" plans.

In order to complete the picture of the learning process, three models presented by Patrick [3] will be discussed: the mixed components, the selection and the exhaustion models.

**Mixed components.** Performance depends on a variety of situations. The learning actions that improve these performance mechanisms will have various distributions of rates of improvement — some faster, some slower. At any moment in time, total system learning will be dominated by the fast learners who will make little contribution to changes in total performance.

**Selection model.** This model proposes that skills increase with practice because the likelihood of selecting the optimal method increases. This method not only includes physical aspects of performance but also the cognitive basis of performance.

**Exhaustion model.** The basis of this model is that the rate of learning decreases with practice as there is less room for further improvement either because this improvement becomes more difficult to find, or there is less time to look for it.

After considering these models it is apparent that the skills and knowledge that are owned affect easily new skills are developed; for instance, hitting a ball with a tennis racket will be much easier if it is known how to play squash, say. In other words, the abilities learnt in carrying out a task, are being "transferred" into the achievement of new tasks.

**4.4 Transfer**
The Department of Employment’s Glossary of Training Terms [3] says that transfer will occur between tasks which require the same skills or skill components and it will depend upon the number of “identical elements” shared between such tasks. Also transfer occurs whenever the existence of a previously established habit or skill has an influence upon the acquisition, performance or relearning of another habit or skill.

There are two types of transfer: positive and negative. Positive transfer occurs when the existence of a previous habit or skill facilitates learning a new one; conversely negative transfer refers to the interference caused by a previously learnt habit or skill on new learning. Examples of positive transfer are: 1) if a person knows how to drive a car, learning how to drive a tractor or bulldozer would be faster than for someone who could not drive; 2) learning to use a computer keyboard if typewriter skills are known again would be faster.

Positive transfer has the advantage of saving time and money, since the new skill or activity to be learnt will be taken in much quicker. There are situations however where the training activities might be very expensive or even hazardous, making them almost impossible to carry out in real terms; for instance, to train a pilot in a real plane would be very expensive, as would be training an operator in a nuclear submarine or power station. Added to this is the tremendous risks associated with both. The focus is therefore to spend the least time training in situ.

Usually, new training is affected by the transfer of a trainee’s existing skills which can be either a help or a hindrance, i.e. writing an essay is not the same as writing a letter even though in both tasks a similar skill is needed; likewise, the cutting-related skills of a butcher and a surgeon although similar in nature are quite different in skill and complexity [3]. Therefore, transfer becomes an important matter since in the event of a lack of, or even total absence of, good training material, a trainee may attempt to understand a new task by recalling analogies and methods which are not always optimum nor might they be the most helpful in achieving the training goals, therefore making the training process more expensive.

The training programmes for whole tasks and jobs will have to be broken down into partial tasks or jobs otherwise the training process will be too large to be analysed. The main aim of partial task training is to maximise the amount of positive transfer to the complete job or task. Training should provide the trainee with knowledge of results concerning aspects of the task. Once again, the main goal of training is to produce the best performance in a real working environment.
4.5 Retention

In order to achieve the best results and to understand everything presented in the training sessions, it is necessary to have a good level of "retention" which can be considered as a special case of transfer since it requires a trained person to transfer his/her skills to the same task after a period of time [3]. Training, transfer and retention are related issues which have to be analysed in an integral way. As far as retention is concerned the following questions arise:

How efficiently is the learnt knowledge applied in emergency situations since these seldom occur, though when they do they can be very costly? How much "refresher" training is needed for some types of specialised job like those in a nuclear power plant? How different is it in terms of effort and cost to train "highly-retentive" individuals versus those with low retention capabilities?

It is not easy to answer these questions because there are many additional factors that have to be considered, plus the fact that every situation is different depending upon the working environment. Retention varies according to the nature of the task and to the length of time during which it is not practiced.

In summary, learning is a social and economic necessity and can no longer be seen as coming to an end as individuals get older. The aim is to encourage them to actively and continuously learn throughout their lives. Learning plays a vital role in the training and education processes.

5. EDUCATION

Education is generally related to, or is synonymous with, what takes place in school. However, it is not only this for, it is a very long term goal to achieve, and can be defined in many different ways; a very simple one is “the knowledge obtained through learning”, or “the field of teaching and learning” [17]. The Department of Employment’s Glossary of Training Terms [3] defines it as activities which aim at developing the knowledge, moral values and understanding required in all walks of life rather than knowledge and skill related to only a limited field of activity.

Over the years, education has evolved, and, in addition to spreading knowledge, understanding and skills improvement, it also focuses on supplying a team culture. Education is both a defining characteristic of modern societies and a key strategic means for realising desired change plus the fact that it concerns everybody. Furthermore, education is about developing the intellectual, moral and practical skills of individuals for the roles they play in today's society. Once
they have been "educated", individuals will have a better perspective of life in general and more particularly of their working environments. These individuals will be really pulling together, working as a team, to reach the organisational goals.

A permanent process of education and training are needed when trying to pursue any objective or goal in an efficient and low-cost way. Without them, there is no company that be able to build a culture of total quality. The education process, however, will have to be systematic. Marino [10] asked the question: why do the change processes in the cultural organisation fail? And he responded, because of the wrong methodology adopted by them. Also he said that the DIE method (*Decision-Implementation-Education*) was a failure since, management take the *decision*, carry out the change or *implement* it, and finally *educate* the people. Instead, he suggested, management should take the *decision, educate* the people, and, lastly *implement* the change(s). The author of this work shares this view.

On the other hand, in trying to educate individuals, there are different methodologies, systems, places, and a great deal of resources involved. But, there has to be a firm conviction that they represent a good investment from all points of view.

### 5.1 Education and Training (ET)

Education and training (ET), refer to the individuals' learning and acquisition of knowledge, skills, etc., by any means. Although both terms could be easily thought to mean the same there is a significant difference between training and education since the latter typically takes place in a classroom and involves a transfer of knowledge through the use of formal methods such as lectures and directed discussion whilst training, Hughey and Mussnug [18] say, entails personal involvement, commitment, and experimental gains and involves learning by doing. However, after analysing the differences in their approaches, the author thinks that they are two different concepts and they embrace different philosophies. The main differences are shown in Table 1.

<table>
<thead>
<tr>
<th><strong>EDUCATION</strong></th>
<th><strong>TRAINING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Embraces wide-range objectives</td>
<td>Embraces specific objectives</td>
</tr>
<tr>
<td>Focuses mainly on long term goals</td>
<td>Focuses mainly on short term goals</td>
</tr>
<tr>
<td>Person-oriented objectives</td>
<td>Job-oriented objectives</td>
</tr>
<tr>
<td>Less tractable or accountable objectives</td>
<td>More tractable objectives</td>
</tr>
<tr>
<td>Not capable of being expressed in behavioural terms</td>
<td>Can specify the work behaviour of the trainee at the end of the training</td>
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<tr>
<td>Seek for personal development</td>
<td>Seek for job skills</td>
</tr>
<tr>
<td>May embrace many subjects and matters i.e. training itself</td>
<td>May be part of a whole education process of the individuals</td>
</tr>
<tr>
<td>Determines individuals’ differences (or talents) enabling them to prosper</td>
<td>Attempts to raise a group of individuals’ performances to the same level</td>
</tr>
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From the table, it is apparent that education and training aim to develop and improve the talent and potential of individuals. In other words they complement each other and neither should be disregarded as being better or worse than the other. The application of either depends on many factors which should be taken into account and thoroughly analysed before taking an implementation decision. Such factors can be: the goals to be achieved, the time span available for both the training and education courses and for the acquisition of results, the actual intellectual level of the individuals, the diversity of abilities, the performance of the individuals during the sessions, etc. Likewise, knowledge and skills are two different things. It is precisely through knowledge that skills are exercised; however, the purpose of acquiring learning skills is to advance in knowledge.

Education is a broader term with a more wide-ranging aim and more general objectives. Some authors consider that both education and training are a consequence of the life cycle, and one follows the other. Forrester et al. [11] said that, "education refers to initial preparation for work and life, training is the bridge between education and job-related skills, retraining involves skills upgrading within working life". Education also means teaching the whole philosophy of any subject, objectives, history of evolution, relationships, advantages, disadvantages, etc. Training is centred around the methodology and techniques associated with the matter or skill to be taught, in order to develop working abilities. As can be seen, education objectives should take much longer to accomplish than training objectives.

ET systems have to change and adapt to the changing economic environment. These changes include the globalisation of the economies world-wide and the swift changes and development of new technologies. Indeed, education and training should be rather conceived as lifelong activities, with the efficacy of training depending always on the educational basis of the individual. Investment in ET by employers plays a key role in economical, social and political success. The education system is described as being "the cement of social cohesion" [19]. Employers should be fully involved in the design and updating of qualifications and in identifying what the educational institutions can reasonably achieve to help develop the attributes needed to carry out the necessary activities [20]. In other words, employers should be strongly supportive of the educational world, and this means for them to share the cost of developing human capital.

Once organisations have taken the decision to invest in ET, labour productivity will be affected. ET can improve economic performance. Reich [19] established that: “employee
productivity levels among countries is directly proportional to the quality and quantity of education and training”. Hence, a high level of ET is an important element in enabling firms to reorganise the work processes in pursuit of new markets.

In conclusion, ET makes it easier for companies to move to a higher skills equilibrium. The new economic, social and cultural challenges of countries will require changes in knowledge, skills, values and attitudes. Changing them however is not an instant process. ET is very important; it positively affects production and the labour market in general since it equips workers with the skills required for innovation in products and processes.

6. THE IMPACT OF TECHNOLOGY ON TRAINING

Technology means different things to different people. The Webster’s Seventh Collegiate Dictionary [21] defines it as “the totality of the means employed to provide objects necessary for human sustenance and comfort.” In other words, technology is the system whereby a society satisfies the needs and desires of its members. The system can comprise hardware, software, people, processes and organisations. Likewise, technology has had a great impact in all the aspects of modern life; how people learn and are trained is one of these. This article reviews how technology has affected training.

Usually, technology is related to "machines". However, these are only visible manifestations of a process without which the machine has little or no meaning [22]; consequently without trained people the process may not have meaning either. Regarding technological developments, the last three decades have produced a variety of new products, processes and services which are not only changing people’s lives but are also transforming society into one with more product consuming desires; in addition, this society is eager to try new technological developments. The list of these developments is vast: computers, robots (according to Bennett [23] in 1988 one robot could produce what six car workers did), drugs, communication systems, manufacturing and banking systems and information technology (IT) in general, to name but a few.

Innovations in technology require a highly trained workforce; therefore, with technological advances occurring at such a speed, individuals need to continuously update their knowledge in order to keep abreast of the changes. Burke and Rumberger [24] stated that, “there are only a few jobs that are not being affected by some sort of recent technological development”. The challenge for these individuals is, instead of working harder, working smarter and more efficiently.
To cope with these technological changes, individuals must be made more knowledgeable and be able to absorb the changes into their jobs. The same applies to organisations which need to keep pace with the changing technology if they want to remain competitive and stay in business. For many companies, high technology, or simply technology, has become a key competitive weapon [25]. If technological changes are ignored or reviewed and left until some future date, the opportunities for market sharing and growth may well be gone. Today’s successful companies are "learning companies" [26], and the new learning technologies such as computer-based training (CBT), the internet, CD-ROM’s and DVD’s are central to the new changes and provoke a revolution of new learning.

The introduction of such new technologies, at all levels of an organisation, has led to new designs of operations and created more technologically-oriented jobs. This has, arguably, made many traditional methods of supervision and management inappropriate. Hence technology may provide an impetus for change [27].

Technology affects employment in several ways. In a bad case (for employees), Burke and Rumberger mentioned that ever since the beginning of the industrial revolution in England, workers have feared new technologies as a threat to their jobs. Unfortunately, this is to some extent true, since technology means automation, and automation generally leads to a redundant labour force. The future impact of new technologies in the work place and the implications of changes in the education and training of the labour force generate the following questions: Will more jobs be created or lost, and what kind, due to the increased use of new technologies? How much education will workers need to operate and match the new technologies?

The answers to these questions are controversial and leaders, businessmen, government officials, educators and researchers have all tried to respond them. Some of the answers are optimistic foreseeing benefits, growth and job developments whilst others, with a pessimistic point of view think that changes bring, along with wealth, adverse consequences for workers; some even suggest that rather than raising skills, new technologies could generate more low-skilled jobs, even though history has demonstrated otherwise.

It is a fact, that organisations have to take more integrated approaches to training, as well as professional and skills development. Also technological changes contribute and have a strong impact on the restructuring of the global economy. These changes facilitate more new deals which produce the creation of more needs. This appears to be a never ending process.
6.1 The use of Computers in Training

There are many jobs associated with new technologies, i.e. in the world of IT there are systems analysts, health technologists, computer peripheral equipment operators, computer programmers, operations system researchers, and database designers. Employment growth has therefore been affected by these new technological changes.

Computers have not only permeated the workplace but also the home, and people at work or at home have rarely finished learning how to use the devices with their current features, before a new software package is released demonstrating much better features necessitating the users to up-date their skills. The computer itself has been developed so rapidly, that the processors which were state-of-the-art six months ago, are now so slow that it would be almost impossible to work with them. According to one specialist [28], the latest and “modern” software and computer packages become obsolete in a time frame of just 8 to 12 months.

It is a fact that computers have changed the way people work. Jarret defined computers as “fast rule-following idiot machines” [29]. In spite of this condemnatory definition, as long as computers have been evolving, there has been a need to refocus the training efforts into more specialised fields. The initial programming tasks in the early days of computers, were fragmented into a number of different occupations, i.e. information technology specialists, systems analysts for designing large-scale software, programmers for writing instructions, code operators, etc. Computers not only create training problems but can also be used to solve them (although Jarret argued that technology did not guarantee that the quality of training was good). They play a big role in both general and TQM training. It is the author’s opinion that they are speeding up the learning process.

With Computer Assisted Instruction (CAI) as one of the most recent innovations in instructional technology, the trainee interacts directly with the computer, which has stored within its systems information and instructional materials necessary for the programme [30]. The individuality of instruction is possible due to the creation of tutorials and it is also possible to customise the training according to the trainee’s needs. Audiovisual techniques and machine simulators, albeit training tools themselves, can be converted into more efficient ones with the aid of computers. In an evaluation study of the National Development Programme in Computer-Assisted Learning in the United Kingdom [31], the computer plays three roles: a tutor, a tool and a tutee. This can give an idea of the importance of this device for training.
Kelada [32] considers that for succeeding in TQM implementation, people need to receive appropriate training and be very well versed in the notions and technology related to TQM (the means) and the effective use of this technology to achieve and maintain total quality (the objective). This use of technology has become a must to be able to cope with the training needs of organisations.

Knowledge management systems is another technological tool that is being implemented and deployed by most large organisations. These systems refer to the strategies and processes of identifying, capturing and leveraging knowledge to enhance competitiveness. According to McCampbell [33] one third of Fortune 1000 companies included knowledge management initiatives in their 1999s plans. Microsoft and Hewlett Packard are two examples cited. They used their networking structures to deploy knowledge and develop their own training data base that could spread on-line knowledge.

It can be deduced that IT plays a big role in the development of TQM and therefore TQM training. Nevertheless, some authors [34] argue whether IT is becoming the most important factor in increasing productivity and reducing costs. However, many manufacturers and service providers have implemented various means for improving quality, reducing costs and increasing productivity in order to seek for continuous improvement in the performance of their businesses.

If it is taken for granted that TQM does not mean discarding jobs and downsizing organisations but, on the contrary, it may create new jobs which will require more knowledge and training, it will also be accepted that within a technological environment it is possible to form individuals with the desire to change and improve. This is achieved with training; and not only requires micro-level investment in developing people, but also macro-level investment in creating a training infrastructure [35].

7. CONCLUSIONS

The author considers that regardless the level of commitment to the training-learning-education process, the need for employee training has increased significantly along the years mainly due to the rapid expansion of technology, business development and globalisation. The main aim of training is to increase efficiency and therefore to minimise operating costs. Education complements and reinforces the training efforts, and learning is the link that comes to make the two actions to be more effective and efficient.
The three concepts, training, learning and education should be linked together when a training initiative, either in general or for TQM, is to be developed in an organisation. This association will make such an effort much easier to implement and much more effective since, as has been discussed, they can be complementary. An individual with more education will have a greater capacity to absorb training; at the same time, his/her ability to learn will accelerate both the education and training processes, making them more efficient. When the initiative is to implement a training programme for TQM, the link should be stronger since the TQM philosophy emphasises change; and training, learning and education can help changes take place more easily.

Additionally, innovation, creating thinking and technology are the main competencies that organisations have (or should) to pursue. Computers and Information Technologies can help both management and the workforce to develop the skills necessary to perform better. Also, TQM and its tools have benefited a great deal from technological development; subsequently, training for TQM is another area that has recouped the same benefits. The author is quite sure that much more can be done to be able to get the best from these technological changes in order to improve training on its own and training for TQM.

8. REFERENCES

   Small Business Bulletin
   The Sunday Times Newspaper, Thursday 14 May

   TQM: Quality Training Practices - Volume IV
   ASQC Total Quality Management Series. Quality Press, USA

   Training - Research and Practice

[4] Kenney, John; Donelly, Eugene; Reid, Margaret (1979)
   Manpower Training and Development - Second edition
   Institute of Personnel Management London

   The History of Industrial Training in Britain
   Avebury, Gower Publishing Company Limited, England

   Skill and the English Working Class 1870-1914
   Croom Helm Social History Series, Croom Helm Limited
Accelerated Vocational Training for Adults
Organisation for Economic Company Co-operation and Development

BS EN ISO 10015:1999
BSI 03-2000, United Kingdom

The Economic Evaluation of Vocational Training Programs
World Bank staff occasional papers; No 21
The International Bank for Reconstruction and Development, Washington, D.C.

Planeación Estratégica de la Calidad Total
Tercer Mundo Editores, Colombia.

Workplace Learning
Avebury, Ashgate Publishing Limited, England

The evaluation of managerial development programmes with special reference to the
Manchester Business School.
Unpublished PhD thesis. University of Manchester

Evaluating Instructional Technology
Croom Helm Limited, England

Total Quality Learning – Building a Learning Organisation
Basil Blackwell Limited

[15] Lange, Thomas; Ottens, Mélanie; Taylor, Andrea (1999)
SME’s and Barriers to Skills Development: a Scottish Perspective
Journal of European Industrial Training 24/1, pp. 5-11

Operations Management (Fourth Edition)
Addison-Wesley Publishing Company

Houghton Mifflin Company, USA

Designing Effective Employee Training Programmes
Training for Quality Vol. 5, No. 2, pp. 52-57

High-Quality Education and Training for All
OECD 2, Paris

Training and its Alternatives
Open University Press, Milton Keynes
Technological Forecasting for Decision Making

Instructional Media and Technology
(Article: What is Instructional Technology? By Robert Heinich)
Community Development Series. Vol. 16. Dowden Hutchinson & Ross, Inc. pp. 3-6

Improving Trainer Effectiveness
Gower Publishing Company Ltd.

The Future Impact Of Technology And Education
The Stanford Series on Education & Public Policy

Managing High-Technology Companies
Lifetime Learning Publications

Advent of 'the learning company'
The Financial Times. Wednesday, 6th May. p. 10

Employee Receptivity to Total Quality

The Sunday Times Newspaper, Sunday, 14th December.

New Information Technology in Education
Croom Helm Ltd.

Training in Organisations

Information Technologies in Education
OCDE – OECD

Integrating Reengineering with Total Quality
ASQC Quality Press Publications. USA

Knowledge management: the new challenge for the 21st century

[34] Dewhurst, Frank; Lorente, Angel; Dale, Barrie (1999)
Total quality management and information technologies: an exploration of the issues
The Handbook of Industrial Innovation
Edward Elgar Publishing Limited