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Total Quality Management — A Model for Tertiary Education

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Introduction

Total Quality Management (TQM) is a management philosophy developed by W.E. Deming, based on his experiences in US industry before and during the Second World War. The subsequent adoption of TQM by Japanese industry, but not by the US, is widely credited for the former's miraculous post-war reconstruction and the current massive trade imbalance between the two countries. In 1986, Deming published a book entitled *Out of the Crisis*, in which he summarised his ideas and exhorted US industry to adopt them as the Japanese had done. Although intended for an industrial audience, his book was also read by educationalists, who attempted to apply his ideas in their own situation. Since then, a number of researchers, including Byrnes (1992), Bonstingl (1992) and Fields (1994), have explored the concept of Total Quality Management in education. A recently founded journal, *Quality Assurance in Education*, is also devoted to this topic.

The aim of this article is to explain the TQM philosophy to the unfamiliar reader in as few words as possible. The explanation is based on Deming's famous "Fourteen Points," as discussed in his book *Out of the Crisis*. The following sections describe how TQM operates in the manufacturing industry, elaborate on how TQM may be applied analogously in education, and deal with a few of the usual objections to the application of TQM in education.

TQM in Industry

Consider the diagram shown in Figure 1, which is an idealisation of a factory. Raw materials enter a process operated by workers to

produce a product, which then passes through a quality control before depatch to the customer. Items which fail the quality control are either discarded or reworked. Everything seems in order, except that the quality control has a number of drawbacks.

- Discarding defective items wastes the time and resources already invested in them, but reworking them consumes yet more time and resources.
- Mass inspection of every item may take a long time, adding significantly to the overall production time, and may be inherently unreliable since there is not time to inspect each item very closely.
- Quality control inspectors must be employed, and paid, even though they do not add value to the product.

A FACTORY

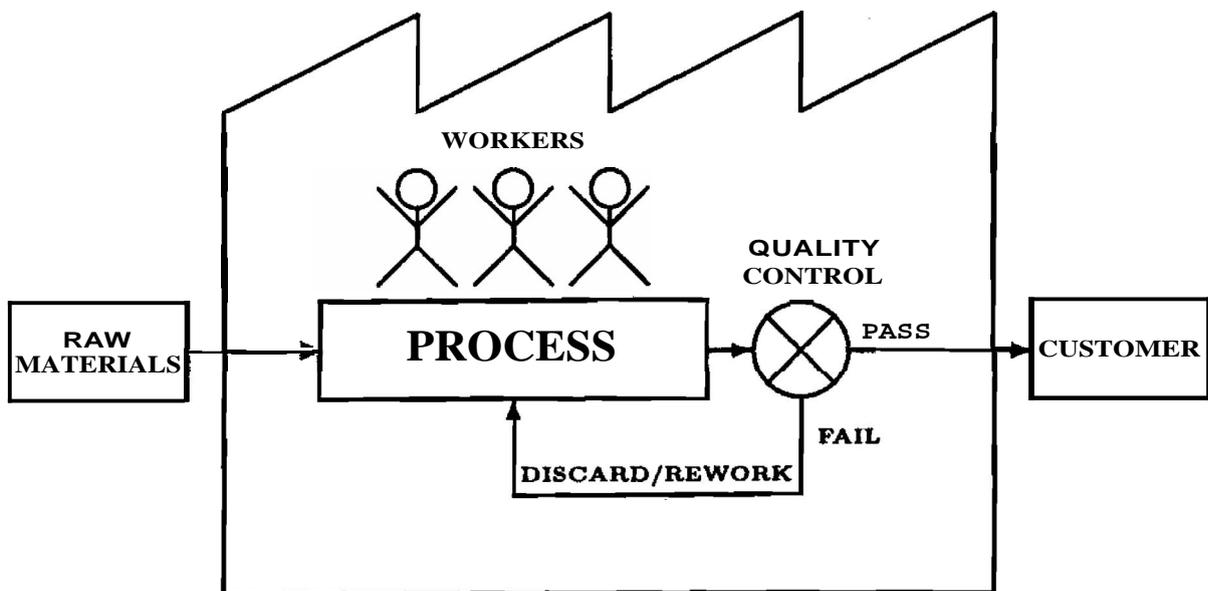


Figure 1.

As a result, overall costs may rise. These, in turn, are passed on to the customer as higher prices, making the product less competitive. Sales fall, and jobs are at risk. In such a situation, advocates of TQM suggest that manufacturers explore the following strategy.

Focus not on the quality of the product but on the quality of the production system you use to produce it. Consider every component of the system, hence the name "total". Find the root causes of the failures and cure them at source. The system will then produce a quality product automatically.

By following this strategy, there will be a reduction in the number of defective items, an elimination of waste or items to be reworked, and a subsequent saving on costs. In addition, since the quality control is not being relied on to assure quality, mass inspection of every item will be unnecessary. The quality control may then be downscaled to a careful examination of a representative sample of the product, which takes less time but is more accurate. Thus the quality control becomes a diagnostic tool which assures the quality of the production system, not of the individual items. Moreover, the quality control inspectors may be re-employed in tasks directly associated with the producing of the product. As a result of these changes, overall costs will go down, making the product more competitive with a consequent increase in the share of the market.

As for the root causes for items failing the quality control in the first place, and how they may be resolved, Deming mentions the following.

Problems:

- a) **Raw Materials.** Poor quality raw materials may be difficult to work with, or may introduce flaws, causing later failure. The lowest quotation rule, where raw materials are selected according to price alone, is particularly to blame.
- b) **Process.** The design of the product may incorporate weaknesses, e.g. using a plastic which is too soft for the screws holding the product together, or may make correct assembly difficult, e.g. electrical components which look symmetrical being wired up the wrong way round.
- c) **Workers.** (i) Numerical goals, quotas and fear of dismissal encourage quantity not quality. (ii) Production lines, where each worker carries out only one task repetitively, encourages the passing on of problems to the next one down the line.

Solutions:

- a) **Raw Materials.** Better quality raw materials may be worth the higher price if they cause fewer problems later and so reduce overall costs. The best way to reduce the purchase price is to enter into a long-term relationship with your supplier.
- b) **Process.** Redesign the product so that weaknesses are eliminated and correct assembly comes more naturally.
- c) **Workers.** (i) Reward quality directly, and encourage upgrading of skills through job security. (ii) Allow each worker to assemble a complete product at his own pace, so that he may take pride in his work and fix problems on the spot.

TQM in Education

Consider the diagram shown in Figure 2, which is an idealisation of a university. School leavers enter the teaching process run by the lecturers, and then pass through an examination before graduating and taking up employment. Students who fail the examinations are either expelled from the university, or must resit the subjects they have failed. Everything seems to be in order except that the examination system has the following drawbacks:

- expelling students who fail their examinations is a waste of the time and money already invested in their education, but to resit subjects takes even more time and money, and may create difficult timetabling problems;
- examining every student on everything they have learnt takes up a lot of time, thus reducing the amount of time available for teaching, and may be inherently unreliable since there is not time to examine each student too closely;
- lecturers spend much time and money marking examination scripts, even though this does not contribute directly to student learning.

In such a situation, supporters of TQM suggest the following strategy:

Focus not on the quality of the students but on the quality of the teaching system you use to educate them. Consider every component of the system, hence the name "total", Find the causes for examination failure and cure them at source. Your teaching system will then produce quality graduates automatically.

A UNIVERSITY

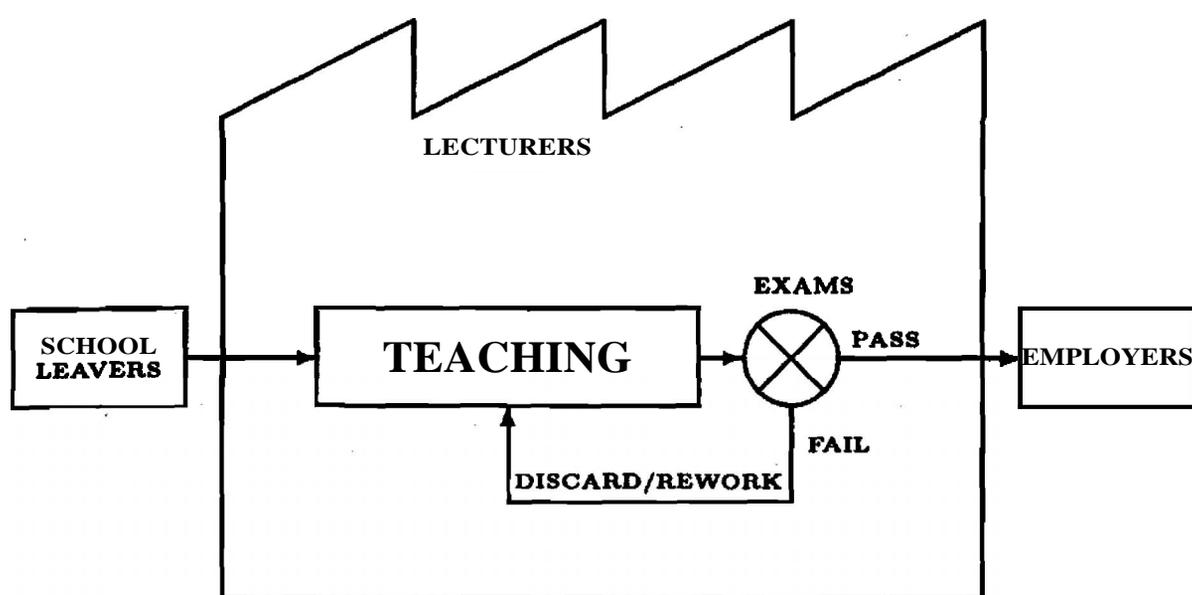


Figure 2.

As a result there will be fewer examination failures, which means less time and money wasted going back over the syllabus, and fewer timetabling problems. Also, since the university is no longer relying on the examinations to assure quality, examining every student on everything they have learnt will be unnecessary. The examinations may then be streamlined, examining students in depth rather than breadth, saving time and effort. Thus the examinations become a diagnostic tool assuring the quality of the teaching system, not of the individual students. Finally, the lecturers are able to spend more time actually teaching the students. As a result, the students will learn more in a shorter time at lower tuition fees, making the university better able to compete in the education market.

As for the reasons why students are failing the examinations, our analogous experience with TQM in industry suggests the following problems.

Problems:

- a) **School leavers.** School leavers without the skills or motivation to make the transition to university education may fail later. Particularly to blame is over-reliance on public examinations, which these school leavers have been trained to pass.
- b) **Teaching.** It is difficult to teach students what does not interest them, and over-abstraction may lead to conceptual errors which are difficult to correct later.
- c) **Lecturers.** (i) When lecturers lack job security, and are judged not on the quality of their teaching but on the grades which their students achieve, naturally they will focus on the examination itself rather than on good teaching. (ii) Hectic timetables, where each lecturer teaches only one component to all students, encourages the passing on of problem students to the next lecturer.

Solutions:

- a) **School leavers.** Time spent exploring methods of selecting students capable of learning in a university environment other than public examinations may prevent more expensive problems later.
- b) **Teaching.** Redesign the syllabus to make it interesting enough for the students to *want* to learn it, with plenty of practical applications to test their understanding.
- c) **Lecturers.** (i) Reward good teaching directly, not good grades, and encourage the upgrading of skills through job security. (ii) Give each lecturer greater responsibility for the total personal development of a small subset of the students assigned to him.

Some Objections

Many members of the teaching profession object to the application of TQM in education. These objections are discussed in the following paragraphs.

- A. *Industrial models are inappropriate for social systems. People are not machines. So TQM cannot be applied in education.*

TQM is a general management philosophy which can be applied to any system which aims to achieve something definite. It is not specific to industry, even though that is where most of the applications have been made so far. Deming himself believed that TQM could be applied to education (Deming, 1986 Chapter 1): "This book makes no distinction between manufacturing and service industries. The service industries include government service, among which are the education and the mail. All industries, manufacturing and service, are subject to the same principles of management." Besides, as any trade unionist will tell you, running a factory is also not simply a question of running machines. In fact, of Deming's "Fourteen Points", written for the industrial context, eleven are devoted entirely to the human factor.

- B. *TQM in education seeks to raise the pass rate in examinations by lowering the pass mark.*

TQM raises the pass rate by improving the educational standard of the students, that is, they pass because they know more, not because the examination asks for less,

- C. *We cannot allow all our students to pass all the time, otherwise people will think that we cannot teach properly.*

This may be refuted with reference to the industrial context. Is it necessary for a large company like Sony to produce at least 10% non—functional television sets to prove to the world that it is a competent manufacturer? Put another way, would a self—financing student enrol in a three year course at a university which he knew he only had an 80% chance of passing, based

on the university's past examination results, when the university down the road achieves the same qualification in only two years and has a 100% pass rate? Perhaps this objection is based on the thought of certain very weak students who enter tertiary education but who do not really have the ability to pass their examinations. TQM does not seek to pass these students, but rather questions the wisdom of enrolling them in the first place.

- D. *Students are not passive in the teaching system but should take an active role in their own learning. Since TQM appears to classify them as merely passive, TQM in education must be wrong.*

This is only to be expected of service industries where, unlike the manufacturing industry, the components in Figure 1 can overlap. For example, in a dental surgery, the customer and the product are one and the same. To clarify, TQM applies in more than one way — students are partly the workers and partly the product —so it has *more* to say about education than about the manufacturing industry, not less. For example, when we argued that judging lecturers on the grades their students achieve causes them to focus on the examination rather than on good teaching, the same applies to the students, that is, they concentrate on learning for the examination rather than learning for intrinsic satisfaction. This is a widely recognised characteristic of tertiary students.

- E. *Universities have always had examinations and this cannot be changed.*

Supporters of TQM do not advocate the complete removal of examinations, but that they should be streamlined in the light of improvements in the quality of the teaching system. It should be remembered, however, that the frequency and quantity of examinations vary enormously from institution to institution. Under the modular system in the US, with continuous assessment, students may be examined in every subject every two weeks. At the other extreme, students at certain established UK universities may be examined only at the end of every year, or even every two years in some cases. Besides, since it is the institution itself which runs its own examinations (external examiners are usually

retained by the institution and report directly to it), the mere existence of examinations is no guarantee of quality. Graduates are employed on the basis of the reputation of the institution, which in turn is based on the experience the employers had with previous graduates. So, if all the graduates of a university can secure employment merely on the reputation that the institution has for always producing top quality graduates, what is the need for examinations?

Conclusion

The concept of Total Quality Management, a management philosophy developed by W.E. Deming (1986) and familiar to manufacturers and captains of industry, is now attracting increasing attention among educational theorists and practitioners. Advocates of TQM in education suggest that the problem of students failing examinations at the university level can be eliminated by the following strategies: exploring more appropriate methods of selecting students capable of learning in a university environment; redesigning the syllabus to make it more interesting for the students; rewarding lecturers for good teaching and not merely their ability to ensure that students pass examinations; and giving lecturers greater responsibility for the total personal development of a small subset of the students assigned to them.

Certain members of the teaching profession object to the application of TQM in education on the grounds that industrial models are inappropriate for social systems. Deming, however, argues that TQM is a general management philosophy that can be applied to any organisation which aims to achieve an improvement in product or service. Moreover, eleven of Deming's famous "Fourteen Points" are devoted entirely to the human factor.

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