



Integration: The Key to Effective and Efficient Quality Education

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In this paper we will show that the impact of education in quality management principles and tools can be greatly increased if integrated with the normal curricula of educational systems. By doing so, many more people will learn about the basic principles of quality management and these principles will then be easier to introduce in different sectors and organizations. Giving people quality skills at the start of their careers will also reduce the need for later professional courses, thus reducing training costs to attain increased quality consciousness. We will illustrate these concepts with examples from three different education levels: high school, university and MBA courses.

It is the twelfth paper in a series of thoughts collected, organized, and promoted by the Quality in Education Think Tank (QiETT) of the International Academy for Quality (IAQ).

The first paper addressed a broader scope of topics and put into perspective the overall field of “Quality in Education”, which set a common ground for further reflection and guidance of QiETT activities. The forthcoming papers, such as this one, focus on more specific topics and delve deeper into particular topics based upon the collection of international inputs from quality and education experts.

To date, this collection of white papers comprises the following titles:

- 1-“Quality in Education: Perspectives from the QiETT of IAQ”
- 2-“Large Scale Training of Quality Professionals”
- 3-“Inclusive Quality of Education”
- 4-“Continuing Education in Quality Improvement for Healthcare Professionals and its effects on organizational improvement”
- 5-“Current Societal Challenges to Quality and Quality Management in Higher Education”
- 6-“Applying Quality Theory to Educational Systems”
- 7-“Training and Teaching Statistical Methods for Quality”
- 8-“Simple Hints to Help Trainers Improve Training Quality”
- 9- “Student Quality Circles: A Step Towards a Total Quality Society”
- 10- “Solving Problems in Education Using Quality Tools”
- 11- “Making Online Education Effective”
- 12 – “Integration: The Key to Effective and Efficient Quality Education”

1. Introduction

Most people active in the area of quality management have acquired their knowledge of the subject during their professional careers. Very often, they attended courses organized by commercial training institutes and gradually expand their competencies. This is also the case with some other professions, and we know that lifelong learning is a must for everyone. The people active in very specialized and technical areas of quality management will especially need to continuously update their knowledge as technology evolves fast. As an example, classical statistical process control may be replaced or complemented in these days of Industry 4.0 by artificial intelligence and machine learning algorithms (Vandenbrande, 2020), through the emergence of the so called Quality 4.0 paradigm (Saraiva, 2020).

However, in most professions, people have received their basic body of knowledge during their formal educational path. That is not the case for quality professionals. In addition, to create a quality driven organization it is vital for quality knowledge to be broadly present and disseminated well beyond the quality professionals. If we say that quality is everybody's job, then clearly everybody needs to have the appropriate quality knowledge and awareness at the right level for each job. We believe that the most efficient ways to achieve this goal is to integrate quality in curricula at different levels of schooling, in order to build better quality driven organizations and societies.

As a starting point for the three levels of schooling that we will use here to illustrate this perspective, we will first look at some quality issues that are often mentioned when we are trying to create a quality culture that touches every member of the organization. Starting from these issues, we will look at the current situation and then show the required actions to tackle this challenge successfully. Then, we will look at business trainings such as Executive MBA (EMBA). The next level we will discuss is training of professionals, where we will make a distinction between manufacturing environments and the quality training of professionals in the service industries. Finally, we will look at high school education to see how we can increase the quality problem solving capabilities of a large group of people that will end up in organizations where such skills are in high demand.

2. Quality Training and Education Challenges

A joint report made by ASQ and Forbes Insights (ASQ, 2016) provides views expressed by quality professionals. The question asked to people active in quality functions was the following: "How directly do your quality management programs touch the following areas of your business?" (a scale from 1 to 7, with 7 meaning high impact, the percentages scoring obtained for answers of 6 or 7 are given in Table 1).

Table 1. Impact of quality management programs on areas of business

Area of Business	% scoring 6 or 7 (high impact)
Operations	60
Research and Development	27
Sales / Marketing	20
Human Resources / Human Capital	22
Information Technology	23
Digital Design and Development	19

Armand V. Feigenbaum published the first edition of his book “Total Quality Control” in 1961. The Japanese called their quality revolution “Total Quality Management” and yet, today, some 50 to 60 years later we still see quality as an almost being an “operations focused” activity (Table 1). This clearly shows that the Total Quality Management (TQM) impact is often lower than what it may be or we think it is, given this narrow focus and that most quality actions are still limited to operations and manufacturing performed by quality specialists. This is an even more serious problem because in the future these areas are actually the ones that will be mostly replaced by automation. If we want to create a total quality culture, we need to adopt much broader views and scopes for quality training and education.

Our lack of such a larger impact is also visible when you look at the influential business gurus. Searches on the internet will give you many lists of important business gurus. We have evaluated several of those lists, and in none of them could we find of any of the well-known “quality gurus”. This clearly indicates that the impact of quality management on overall business is much lower than we like to think. It should also worry us that gurus like Deming, Juran, Ishikawa or Feigenbaum, did most of their fundamental work at least 40 to 50 years ago. In the current popular lists of important business gurus one can find today any women, people from different areas in the world and young people, but not quality professionals. This seems to indicate that we have been very bad at communicating our message, and quality education or training are also ways to build stronger and larger communities of quality leaders, readers and influencers.

Given this overview, in the next sections we will illustrate these issues through three more specific examples, describing for each of them the quality issues involved, current states and suggested improvement actions.

3. Quality Training for Top Executives

Quality Issue

Quality managers very often complain about the lack of support for quality from top management. In the ASQ and Forbes Insights joint report (ASQ, 2016) this problem was actually raised by 40% of the participants as a reason why quality efforts fail. The importance of top management in quality has also been expressed by Dr W Edwards Deming, who stated that quality is made in the boardroom (Aguayo, 1991).

For quality to be made in the boardroom, there needs to be enough quality knowledge within that boardroom. It is important that the quality manager who belongs to the boardroom to have an impact on the strategic level, but this is not good enough, and we need other top level and c-level people to get quality training. Unfortunately most of the people that take a seat in the board of directors have no quality management knowledge at all. Many of them have been trained as business leaders in business schools, typically by attending an EMBA (Executive MBA) program. These courses put a lot of attention on leadership, financial management and marketing management, but typically do not cover any quality related principles or methodologies, as we will describe next.

Current Status

When examining the curricula of a number of EMBA programs we could not find a single one that had quality management as a separate highest level topic. Very often there is a module called “operations management” and sometimes quality management can also be found within that module of the

Required Actions

It is not really important that our quality thinkers end up in the top ten of guru popularity. Actually the word guru used in a business content is an exaggeration in itself, putting too much weight and importance on individuals. But it is very important that the fundamental ideas of quality management stand at the core of any company strategy and are known by top executives. A quality manager with good communication skills and knowledge of the business can make a serious difference within the boardroom, but of course it would be much better if all people in the boardroom had at least some fundamental knowledge of the principles of total quality management. To achieve that we need to have quality management as an integral part at the high level contents in EMBA and other executive training courses.

This can only be achieved if quality professionals and quality organizations start focusing on this aspect and try to influence business schools in doing so. In other words, we need to lobby to get attention for total quality management at this level, knowing that this will lead to better organizations and better societies in the long run.

4. Quality Professionals

Quality Issue

The issue we want to focus on here is related to efficiency / cost analysis. If we look at quality professionals today, specifically in manufacturing companies, most of them are technically skilled and very often have an engineering background. They develop their quality management skills through additional courses during their professional career. However, many of the topics in these courses were also part of their engineering curriculum. So there seems to be room here to improve education resource allocations if a more integrated way is adopted.

Current Status

We have been training hundreds of people over the last 20 years in courses like Six Sigma Green Belt and Six Sigma Black Belt. Most of them are engineers and at least 90% of the people following these courses had a statistics course during their formal education studies. When asked what they remembered from statistics, the general reply is little, if anything. In fact, few of them had ever used statistics after having passed the exam at the university and they were generally very pleased about that.

So now the same people follow an expensive course to relearn to a large extent what they already learned years ago. In production, doing something twice is called rework and typically classified as an internal failure cost. But when it comes down to training things that you already (should) know, we classify it as prevention and state that it increases the competencies of our personnel. There seems therefore to here room for achieving significant improvements.

Required Actions

If people are taught a skill in school that is extremely valuable for their career but, that has to be completely retrained when they can actually make use of it in their professional life, there seems to be room for clear improvements to be made. In our view the main problem is that courses on statistics tend to be general and the same course is given to a large group of quite different students. There is a clear difference between a student in mathematics and an engineering student in what they need to take away from statistics courses. In an engineering masters, we need statistics for engineers by engineers and not for mathematicians by statisticians.

Some elements that ought to be different in a statistics course that has more value for future engineers are the following:

- A mathematical insight into the formulas that govern statistics is of little much value to an engineer. As an example, knowing why a t-distribution is the right distribution to be used in order to do a hypothesis test to compare the means of two populations is not so important for an engineer. We can safely say that all major statistical routines that are used within manufacturing have been proven many times over in their 200 + years of existence.
- The main value of statistics to an engineer is that it can help him understand reality better. Out of the data coming from a process, statistics can generate useful information about that process. Again, the mathematical background also adds little additional value here.
- In the real world, very few people will actually do statistical calculations. There is an abundance of software available that will allow people to get all the valuable information out of the data without ever having to calculate anything. The importance is that an engineer knows what technique to use for what problem and what the result means for the process studied.
- Examples used in statistics courses for engineers should be real life examples coming from existing processes.
- Very often, in universities the focus is on research, but very few engineers eventually end up doing research. So, we need to make sure that there are also plenty of real life actual process examples related to the technical expertise of the engineering student. In that way we can link the subject matter knowledge of an engineer – be it chemistry, metallurgy, mechanics, electronics - with the statistical insights needed to understand processes better.

This is probably the easiest area to make important improvements, so that engineers - all engineers - get the kind of statistical knowledge that they will need once they are active as process owners, and it will give them the basic knowledge to become quality engineers.

5. Other Professionals

Quality Issue

We live in a service economy, where only 25% of the economic activity consists of manufacturing, and 75% of services. However, the quality world is still to a large extent dominated by manufacturing, both in members of quality associations and in the language that we use within our standards. It is another example of how we still fail to achieve the Total in TQM.

Current Status

The service industry is a very wide area, with many different specialties. There is clearly a difference between a bank and the financial professional on the one hand and a hospital and the medical professional on the other hand. However, both will come into contact with customers / patients that are very sensitive to the quality of the service delivered.

This quality of service is not only related to the professional knowledge of the medical doctor or the financial advisor. In fact, if we take the example of a medical doctor, very few patients have doubts about the professional knowledge of their doctor. We have confidence in his / her abilities to perform a correct diagnosis and to propose the proper treatment. The quality experience of the patient is in fact much more determined by secondary elements, like the quality of communication or the waiting times in hospitals.

Required Actions

The aim is not to make every professional a quality expert, but to make them aware of the fact that the perception of quality by a customer is defined not only by the technical expertise of the service provider. In our view there are two ways of approaching this within the education system.

The easiest approach is to add a one semester course on basic quality management principles to the curriculum of any professional training track, where the basic content is the same but the details and certainly the examples are adapted to the specific technical area. A very simple course on service quality just focusing on some basic issues like communication and the importance of the service offered beyond the professional specialty could be of extreme importance for improving the overall customer service. Of course, in an already filled schedule, this is adding another block of hours to the plan of studies, but really worthwhile doing.

An alternative way would be to incorporate elements of quality management within the existing training programs by making professors aware of fundamental quality principles, understanding how important these aspects are for the wellbeing of customers. We already have come a long way in this thinking, but further steps can still be made. As an example, communication between doctor and patient is extremely important for the feeling of wellbeing of the patient. This means that during the studies to become a medical doctor attention also needs to be paid to these kinds of topics. Several medical schools already do this and recently there was an example of training doctors in bringing bad news, using role play and feedback. This reality learning makes those people become better doctors.

6. High School Students

Quality Issue

Quality is everybody's responsibility, and so if we want to create a quality culture, we need to engage a very large proportion (preferably all) of the people working in the organization. In addition, we need problem solving skills at every level if we want to move forward quickly and

adapt to change. Today this thinking is very much pushed top-down and people feel forced to change, rather than being part of that change.

Current status

In order to achieve a quality culture, we see a lot of courses being given to large groups of people on several subjects. A very popular one is motivation, but this is very rarely a real problem. Most people are motivated to do a good job and a lot would be achieved if management would avoid demotivating them. Another very popular subject is problem solving. We are not talking about complex methods, like Six Sigma, but about basic problem solving skills, like the ones applied within quality circles and student quality circles.

Companies are very interested in hiring people with problem solving skills, where they are not only looking for the technical skills in problem solving but also for a drive towards improvement. Both the knowledge and the attitude are of great value to any person entering the job market, no matter what job you are aiming for. Therefore, everyone should be trained in these subjects.

Required Actions

We could introduce courses on problem solving at the high school level, but in our view this is not the direction to go because it is not the most efficient way to increase the problem solving capacity within our young population. We should look much more in applying some of these basic techniques within the current curriculum.

Many students in high school do not like mathematics, especially the ones that are studying humanities. The main complaint you hear from these pupils is that they do not understand how on earth this will be of any use to them in the rest of their lives. But if you can use the hours foreseen for mathematics to teach people problem solving skills, including simple mathematical tools, this could open up a whole new world for these students. In addition, it would increase the problem solving capacity of the society as a whole to a very large extent.

A very popular topic today in quality management is Toyota Kata, sometimes referred to as Lean Kata. The essence of this methodology is that if you want to make continuous progress at all levels of the organization and in all aspects of the business you cannot leave problem solving to a limited group of specialized professionals. The only way to really make progress is if all of your people are, at their level, problem solvers. Living more and more in a VUCA world (Volatile – Uncertain – Complex – Ambiguous) will make this increasingly valuable and an absolute necessity. It would therefore help if the people that entered your factory already knew the basic concepts of what this means and have the mindset to continuously improve whatever it is they are doing.

7. Conclusion

Quality management is a vital aspect of any organization. It is also an element that could play a major part in creating a more sustainable way of doing business. But to make this possible we need much more people at all levels with knowledge on quality management principles, methods and tools. All of this can be found in professional courses, but it would be much more efficient if this knowledge was integrated in educational programs that people already follow. There are possibilities of doing that at an Executive MBA level, in training professionals at universities and even by introducing practical tools of problem solving at the high school level.

8. References

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