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Educating management: by mentor

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ABSTRACT: There has been, for many years now, some introduction to management in most, if not all, engineering curricula, arising from the belief that engineers need to have some level of management knowledge and skills. Indeed, that belief extends back, in Sydney, Australia, at least, for decades, having been noted in the 1950s and, even in a different context, in the late 1940s. One might question, after such an established history, whether there is any need to look into teaching management to engineering students but experience in industry has shown the need is quite real. If that can be agreed upon, then the process of teaching management can be investigated. There is always some value in re-examining what has been done in the past in order to ensure the reasoning still applies in the present with, one might say, an adaptation of Santayana's dictum in mind, leading to seeing whether change might indeed be valuable.

INTRODUCTION

George Santayana's advice was: *Those who cannot remember the past are doomed to repeat it*. Here, that is adapted to: *Those who cannot review the past are doomed not to make progress to something better*. What is proposed in this article is to look at an aspect of management education for engineers, then offer a thought for the future.

IN THE BEGINNING

This author experienced management education for engineers at a very basic level in the late 1940s, provided in the Apprentices School of Commonwealth Aircraft Corporation Pty Ltd at Lidcombe, NSW, Australia, because the Superintendent of Apprentices, W.T. Craggs, believed that some of *his* apprentices were going to be the foremen and supervisors, even managers, of the future (this was reviewed in more detail in [1]).

Craggs covered the basics of management with notes for the ten lectures [2]. This began with an *Introduction*, then chapters covering: *Work through the Ages, Worse than War (Accidents in Industry), How to Become a Supervisor*; *Organisation Charts*; *The Responsibility of Foremanship*; *Leadership Objectives*; *Organisation and Control of Industrial House-keeping*; *Job Specification*; and *Awards in the Making*. Much of the content is still relevant to management today.

None of the references cited by Craggs have been traced, but as none of them appear to be directly aimed at *engineering* management they are not strictly apposite to this discussion. However, one text has been found, dated a little later with a publication date (1961) suggesting it would have been written in the mid-to-late-1950s [3]. It is an interesting work, dealing heavily with what an engineer *does* in administering the engineering function; it is also interesting because there are chapters on *The Technical Publication* and *Safeguarding Industrial Secrets*, *but* nothing on people management and leadership, even though there is a chapter titled *The Structure of the Engineering Organization*.

The Associateship of the Sydney Technical College (ASTC) Engineering Diploma of the 1950s-1960s was approximately contemporaneous with Cronstedt's book, and provided students with about 12 weeks of a very brief management subject. The author remembers this as referring principally to industrial relations aspects, but not, strictly speaking, to management as engineers might experience management.

After Cronstedt, there seems to be a gap through to the 1990s, with the exception of this author's first edition, assembled from notes issued week by week to a class (known to be a not-uncommon manner of writing a textbook) [4]. Summing up, there appears to have been little in the *engineering management* literature up to about 1990, although there had been a steady stream, one might even say a torrent, of books on management generally, since the beginning of the 20th Century.

Writers who contributed to that flow are well known in management teaching and the list is too numerous to cover in full: mentioning Fayol, Follett, Allen, Drucker, Maslow, MacGregor, Luthens, Mintzberg, Handy, Adair, Hunt and Bennis is sufficient as an indication of the number of writers, most appearing after 1950. Many were used in the MBA schools, which became established in Sydney from about 1970.

PROGRESS INTO THE 1990s

By 1990, there were at least two engineering faculties in Sydney with a management subject included in the engineering curriculum, plus an extended subject in the engineering course provided by the Sydney Technical College. This presents a

chicken-and-egg problem, for did the existence of the courses lead to publications or *vice versa*?

Reflection on that question has led to a hypothesis that there was neither chicken nor egg, but the two grew independently of each other. That is supported by looking at the direction of the majority of the literature, most of which was about management *generally*, that is, not about *general management*, but covering the subject from a general executive viewpoint, with further support coming from a skim through what has been written by the range of writers listed above; none refer in any detailed manner to technology and how it is managed, and none consider the management work engineers perform.

Why is it so? And is there justification for referring engineering management students to those general writers?

Well, yes to both questions. First, engineering management is a parochial division of management generally, and no matter in what discipline a manager operates, the *management work* is essentially the same, as was expressed during a conversation between a psychologist and a non-technical, marketing department manager, during an interview for a more senior position, in a yet-unpublished management work of fiction [5]:

> *But this is a very technical operation, Murray pointed out. What do you know about the equipment and the processes?*
>
> *Bruce looked quite bemused at that question: A manager doesn't need to know how it's all put together, or what it does, or how it works, to manage the* system. *Management is management. I mean, management is what managers do. Like I do.*
>
> He's probably right, *Murray thought.* Well, to some extent.

Second, it is, therefore, very reasonable to conclude that no matter what field of endeavour is considered, any management text covers the particular field, generally.

But specialised literature in engineering management did start to appear. Examples additional to ref. [1] can be cited Samson (Australia) [6], Babcock (USA) [7], Henderson *et al* (England) [8], Kinsky (Australia) [9], and Compton (USA) [10], in chronological order, from 1989 to 1997. These are all worth examining, if for no other reason than the spread of information in them shows the diverse nature of the work an engineer may perform.

THE MISSING LINK

Now to an opinion, based on reading many of the writers already cited, reading the monthly paper from the Australian Institute of Management, listening to academics talking management, and having personally taught management to engineering students: something has been seen to be missing in both the available texts and most of the teaching given in classes, something which exists in the real world outside the book and the classroom.

As a reflection on that, consider how one may learn (or should learn) management *out there* in the real world by the best means. One begins (or should begin) in some junior management position, and work under a senior person from whom the junior absorbs knowledge on *how to do things* (the way to do the work) and *how we do things around here* (the organisational culture). Those two *hows* are what is missing in teaching management (whether general or engineering) in a classroom, because most of the texts have been written by dyed-in-the-wool academics and most of the teachers, lecturers, professors *et al* have also had their wool well and truly dyed the same academic hue through an extended period, so have lost touch with work methods and culture.

The missing link is what is termed *out there* in business and industry as a *mentor*, the senior person who serves as an example. Yet the mentor is not available in the classroom.

As a further reflection on the above thoughts, this author sadly recalls accepting his first engineering management position, at a relatively mature age, *in a small organisation*, in which no mentor was available. Later work experience in a large organisation, in which the author was appointed as mentor to a beginner-engineer straight from university, reinforced acknowledgement that having a mentor is indeed a great benefit.

Now to the real question: how can one provide a mentor when teaching management to engineering students in the far-from-the-real-world classroom?

PROVIDING A MENTOR TO STUDENTS

One might suggest bringing in visiting speakers to tell the class about what they do. That is good, but there is some difficulty getting a visitor to focus on the syllabus material, an occasional visitor provides no continuity, and too many visitors would dilute the overall subject. One might also suggest using lecturers who have recent relevant management experience. Very good, but finding managers with that experience, *and* who have the time to do part-time teaching, *and* who also have the ability to teach, is difficult.

The answer to this idea of providing a class-room management mentor developed from the author's use of case studies as weekly assignments for engineering management classes [11]. This resulted from trying to provide an unusual, thought-provoking, thinking-promoting, semester-end, final assignment to a class. The answer came via an indirect route, was also from an unusual source, of an unusual form, and although offered to the whole class was limited each semester through about ten years (20 semester classes) to a maximum of five who volunteered to accept it. The limitation was, simply, the available number of copies of the book to be used.

The source of the assignment was a paperback book titled *The Man Who Counts* [12]. This is a novel about three people (Nicolas Van Rijn, owner-manager of a large enterprise, Eric Wace, an employee, and Lady Sandra Tamarin, member of a royal family) forced into a harsh environment in which they can only survive for a limited time, with not only scant resources but also profound difficulties in getting help before those resources ran out. The key character is *a manager* (Van Rijn), and the assignment was to examine him and his behaviour in the light of the subject being learned. This assignment was first offered in 1987. Here are most of the assignment's introductory paragraphs, in the most recent version.

It is a question on management culture in a commercial-technical environment, under exceptional conditions of crisis and stress, looking at it from the viewpoint of the manager, the managee, and some characters external to management, but all away from the normal work situation of the management characters involved.

The book on which the assignment is based is The Man Who Counts, *by USA-author Poul Anderson. It was written in the mid-1950s, about thirty years ago, as a magazine serial. I read it then, and have since re-read it in this paper-back format containing the author's up-dating comments, which show how little it needed revision after so long (I also have a hardcover copy, and that's signed by the author).*

Let me introduce you to Anderson: he is a tall, rather shy fellow (or so it has seemed to me, when I met him in January, 1988 and September, 1993), a professional writer, that is, he actually makes a living by churning out words[1]*. He does that very well indeed, and the list of his books (over a hundred), short stories and articles is so enormous that he's lost track of them; when I asked for a list he advised me to write to a professional bibliographer to get a full list, because he can't supply it. The bibliographer did*[2]*.*

There was a question foremost in my mind when I met him. It was quite simple: I asked him whether he knew much about management per se, *and he replied that he believed he didn't. This surprised me, because (as I said to him) the impression I took from* The Man Who Counts *when I read it so long ago, and from later re-readings, was that the author must have known, by training or experience, what he was writing about.*

He replied by saying that might be so, but he had no formal training at all in such disciplines; he graduated with a BSc in Physics (or something similar) and fell into writing because there was a low demand for BSc graduates like him at the time. However, he added, others must have gained the same impression as I described, because some few years back the University at Stanford (near San Francisco, in California, where he lives) ran a graduate seminar using as its basis the series of which this book is one part. He sat in on much of it, and remembers the interesting analysis they took from his series of books with that common background.

After our conversation I revised my early opinion: instead of formal knowledge, the author must have had an intuitive grasp of several essential aspects of management.

Now to the details of the assignment. The character Nicolas Van Rijn, who features in The Man Who Counts, *as well as in several other books by Anderson, is the owner-manager of a large trading commercial empire which operates in an advanced technological society, the Polesotechnic League. One can infer from this book (and confirm it from others) that he has very largely built up his business from the bottom, and it is at the stage where political involvement is both necessary and inevitable.*

Some of the questions, which can be asked about this sometimes unspeakable, rascally, self-serving, greedy, lecherous, sometimes inspiring, dedicated, generous, risk-taking, humorous, character, and his company, are:

1. *How would you classify Van Rijn a manager?*
2. *What do you deduce is his* normal *management style?*
3. *Is that style appropriate to the company he operates?*
4. *How does his style fit into the crisis situation?*
5. *What effect do you imagine his leadership and management style has on the structure of his company?*
6. *What methods does he employ to get others to do as he wishes?*
7. *What* corporate culture *do you see existing in his company?*
8. *Would those features be as applicable to* engineering-type *people as they are shown to be in this book?*

A further question, introduced in general discussion around the class, was: *Would you like to work under him?* The range of answers covered: *yes*, *no*, and *for a while, to learn from him!* The assessment of Van Rijn (in the above sentences) comes from reading that book and several others that feature him. Anderson obviously wanted to present the reader with a protagonist whom the reader could like on one page then would dislike intensely on the next.

ASSESSMENT INSTRUMENTS

Students were supplied, of course, with information which they could use to assess Van Rijn. The subject text and material presented in the lecture series gave them a long-established range of ways by which a manager can be examined and assessed, principally these, many of which are from elderly and indeed old-fashioned literature [4]. These are as follows:

- Management functions and skills;
- Management resources;
- Maslow's hierarchy of needs;
- Blake and Mouton's management styles;
- Reddin's 3-D style model;
- Mintzberg's management roles;
- Macoby's management roles;
- MacGregor's Theory X and Theory Y;
- Kant's temperaments;
- Adam's *boss styles*;
- Dos and don'ts of delegation;
- Decision-making levels, models, and techniques;
- Need for vision in planning;

[1] The author regrets to state that Poul Anderson died in 2002. This article may be considered to be, to some extent, a tribute to him and his writing.

[2] Benson's bibliography of 1988 lists about 100 books, while the author's collection contains 110, plus many short stories in anthologies edited by others.

- Organisations, formal and informal;
- Leadership theory, factors and styles;
- Management control processes;
- Management change processes;
- The importance of *the bottom line*.

Whatever bottom line may refer to in any particular case. For example, we hear much today about *the triple bottom line*, but in the case to be considered by the students, re *The Man Who Counts*, the *bottom line* included *staying alive.*

STUDENT RESPONSES

One might argue that students were given a lead into assessing Van Rijn by the description given, and, sure, that was intended to start them thinking. Tabulating responses, by going through the available samples of submitted assignments (20 retained out of a total of the order of 100) proved to be difficult; no statistics can be given, only what a majority have identified.

There were two quotations that apparently resonated in students' minds and were given by many students, from Van Rijn's personal remarks. The first illustrated how a CEO cannot know everyone in the organisation:

> *I cannot know every man in the company, so promising youngsters like you do go sometimes to waste on little outposts like here!*

The second showed his recognition of the need to delegate, although expressed rather brusquely:

> *Bah! Details! I am not an engineer! Engineers I hire. My job is not to do what is impossible, it is to make others do it for me.*

Students used many of the assessment methods discussed in class, agreeing that Van Rijn was an autocrat, a successful leader (although opinion was divided between the *great man* and *trait* theories), task-dedicated, somewhere between 9.1 and 9.5 on the B-and-M grid, and generally at the Maslow *self-actualisation* level. Students also pointed out that he was shown in a crisis situation, which tends to depress the individual to a lower Maslow-level, perhaps as low as *security*, and shift him to the more extreme end of autocracy, but in a less stressful position he would come over differently. To illustrate that, one student sought out another of Anderson's books featuring Van Rijn, and showed that there, in different circumstances, he dealt with people in a more reasonable manner.

Students showed they understood the distinction between formal leadership (the *boss* situation) and informal leadership (the *companion* situation), and how the distinction can be blurred by perception. Strictly speaking, Van Rijn was formal leader of his group of three castaways, but being in the same boat (literally as well as figuratively) as the other two tended to reduce the relationship to informality – until orders had to be given and obeyed. To the natives among whom they had landed, he was no leader at all – until his knowledge showed them economic and strategic benefits, after which he moved through informality to formal leader.

Several students quoted the last paragraph in the following passage, give here nearly in full as typed by at least two students, as the best evidence of what comes out of studying the character. It comes from a conversation between Eric Wace, Van Rijn's *promising youngster* engineer-employee, and Lady Sandra, after the crisis was over and they were recovering, with Lady Sandra speaking to Eric:

> *I awaited this to come. Eric. I, who was born to govern ... my whole life has been a long governing, not? ... I know what I speak of. There are the fake leaders, the balloons, with talent only to get in the people's way. Yes. But he is not one of them, without him, you and I would sleep dead beneath Achan.*
>
> *But –*
>
> *You complain he made you do the hard things that used your talent, not his? Of course he did. It is not the leader's job to do everything himself. It is his job to order, persuade, wheedle, bully, bribe – just that, to make people do what must be done, whether or not they think it possible.*
>
> *You say he spent time loafing around talking, making jokes and a false front to impress the natives? Of course! Someone had to. We were monsters, strangers, beggars as well. Could you or I have started as a deformed beggar and ended as all but king?*
>
> *You say he bribed – with goods from crooked dice – and blustered, lied, cheated, politicked, killed both open and sly? Yes, I do not say it was right. I do not say he did not enjoy himself, either. But can you name another way to have gotten our lives back? Or even made peace for those poor warring devils?*
>
> *Well, maybe, he said at last, grudging each word. I ... I suppose I was too hasty. Still - we played our parts, too, you know. Without us, he –*
>
> *I think, without us, he would have found some other way to come home. But we without him, never.*

That last paragraph, in the minds of many students, expressed the recognition of the importance of *the man who counts*: the person who is able to get done what must be done to overcome the surrounding odds.

DID STUDENTS SEE VAN RIJN AS A MENTOR?

The student who included the above long passage listed the *techniques* mentioned by Lady Sandra, plus some others, with notes indicating whether he would use them:

- Bribing - No
- Lying - No
- Blustering - Yes, for that difficult situation
- Pleading - Yes, for that difficult situation
- Shining - Yes, especially for the boss
- Politics - Absolutely mandatory
- Promising - Yes
- Talking - Yes
- Joking - Yes
- Killing - No
- Misrepresentation - Yes, for that difficult situation

As further evidence of Van Rijn's mentor-influence, here is a paragraph from another student's assignment paper (indeed, the first six words show how Van Ran impressed that student):

> *The thing that I have learned from my experience with Van Rijn is that at times managers seem to be too hard and they ask things of people that seem to be too much. But it is their job to push people and that they are the management's representative to the workers and not the other way round. If Van Rijn had not pushed as much as he did then they would have all starved. I have learned that sometimes you have to do what is required to get the job done. It is also vital that you have a clear vision otherwise the work is of no value. In this area I believe Van Rijn is superior to any manager I have seen. Maybe they only get that good in the pages of fiction.*

So Van Rijn, the sometimes unspeakable, rascally, self-serving, greedy, lecherous, sometimes inspiring, dedicated, generous, risk-taking, humorous, character apparently served as a mentor, indeed, a man who counts as a manager. Not a *counter*, as a *bean-counter* (although he was, obviously from the character displayed, conscious of the importance of cost and wealth), but as the *one who matters when the chips, and the beans, are down.*

WHY TEACH MANAGEMENT TO ENGINEERS?

There is greater emphasis placed on management for engineers when compared to engineering education of 50 years ago; this is probably good because years ago, there was a lack of engineers getting to the more general management levels, so we had people managing technology they did not understand. There is now stronger recognition that the engineering profession itself requires the application of management skills and techniques. Hopefully, in the future, there should be more people understanding the technology they are managing.

THE RESIDUAL QUESTION

All the above has left a question niggling in the author's mind: who was taken as a mentor by the students? Was it Van Rijn, the character in the book, as said a few paragraphs back? Or was it Anderson, the writer of the book? Or was it the subject lecturer, this present author?

Van Rijn is the so-obvious choice, because his character and actions were to be analysed. Students agreed they learned many important management principles from him. But there is enough in the student comments to show they recognised him to be a *bad character* in some ways, even though his actions suited the circumstances that had to be overcome for survival. Yes, that choice seems likely, but there are arguments against him.

Poul Anderson? After all, Nicolas Van Rijn was his creature, Anderson's was the guiding hand (on the typewriter, no computers when the books was originally serialised), which formed Van Rijn as a character and caused him to act in certain ways. But in conversation with the author, Anderson admitted he had never learned management specifics, he was not writing about management, only developing a good story, and the central theme, really, could be described as being more about cultural differences than about management. Yes, possibly, but one could argue against choosing him.

The subject lecturer? The one who introduced the use of case studies into the subject, extended that to the use of a novel as a *case*, *conned* a number of students into reading it as an assignment, and led the students through the analysis? As the work used, the novel, was entirely by another, such a claim would not only lack modesty but also be rather unreasonable. Except, perhaps, to take small credit for an innovative step in teaching?

Indeed, is finding an answer to that question, *who was the mentor*, really important? Probably not. Just as Van Ran has been shown to be the extreme pragmatist, to whom only good results mattered, what matters in this fragment of personal academic history is that the use of Poul Anderson's novel, *The Man Who Counts*, *worked*, providing novel (a play on the word) instruction in a management subject for engineers.

FINAL COMMENTS

The development of engineering management case studies began by seeking cases to suit engineering students and finding nothing in the past to suit that particular audience [11]. The move towards using *The Man Who Counts* came from several years of having invited students to write a final assignment based on their choice of an interesting-to-them management topic, and then seeking something more demanding. Both steps came from looking back then looking forward.

Is that a thought for the future? The author believes it should be, we should all try to find new ways of presenting our teaching. Some may not work as well as others, but we should try to develop, not allow stagnation. Certainly, this assignment was used about 20 times over some ten years, but it was mixed in with an ever-changing set of other assignments and always brought out some new thoughts from students.

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4th Global Congress on Engineering Education: Congress Proceedings

edited by Zenon J. Pudlowski

This volume of Congress Proceedings comprises papers submitted to the *4th Global Congress on Engineering Education*, which was held at Menam Riverside Hotel, Bangkok, Thailand, between 5 and 9 July 2004, with King Mongkut's University of Technology Thonburi (KMUTT), Bangkok, as the principal co-sponsor and co-organiser. The chief objective of this Congress was to bring together educators, professional organisations and industry leaders from around the world so as to continue discussions tackling important and contemporary issues, problems and challenges in engineering and technology education.

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