

Sustainability through the TEAM EFFORT Formula

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Abstract:

This paper examines a “Team Effort” formula as a means of both delivering sustainability in the built environment context and evaluating pedagogical concepts. The conceptual formula of: TE (team effort) = AM (appropriate management) + EF (evaluation framework) + FO (focused outlook) + RT (risk translation), examines a range of criteria drawn from each element of the formula in pursuit of specifically improved project management. These are set in the context of the sustainability agenda.

The aim of this study, involving over 100 students, is to highlight the value of 'learning from acrostics', the independent evaluation of concepts and the need to adopt a high level integrative visionary approach in developing a model for project and sports management teaching. It has been found that students engage constructively with a variety of information transfer methods and that they need prompting to recognise aspects of sustainable development within this Team Effort formula. However, there was a resounding agreement that this approach is the delivery of specific lectures would be beneficial to students in the short- and long-term.

Business experts and corporations have identified the need for teamwork in delivering products and processes, whilst sustainability requires an integrated team-like approach to produce integrated solutions across the Triple Bottom Line of economic stability, environmental enhancement and social inclusion. Within the context of the built environment, construction management is a key skill in providing fit-for-purpose and quality projects.

Knowledge and understanding for this study have been obtained through assessment of teaching and learning activities for students in higher education sectors using lectures, consensus building and drawing from a range of built environment disciplines. The results were compared with published literature.

Keywords: Construction Management, Sustainability, Teaching and Learning, Team Effort.

1 Introduction

The term sustainable development (SD) became fashionable during the 1980s, in the World Conservation Strategy and the 'Brundtland' Report (Moffatt, 1995) by stressing the need for the simultaneous achievement of development and environmental goals (Mitlin & Satterthwaite, 1996). This international importance and value of sustainability were firmly established by the United Nations General Assembly as it charged its World Commission on Environment and Development Chairman, Gro Harlem Brundtland, to develop 'Our Common Future' (WCED, 1987), with the resulting classical definition of Sustainable Development being '*a development that meets the needs of the present without compromising the ability of future generations to meet their own needs*'. The Brundtland message was directed towards people whose wellbeing was the ultimate goal of all environment and development policies, and in particular, the Commission addressed the young, recognising that the world's teachers have a crucial role to play in bringing the final report to them, an equivalence for education.

The United Nations continued its contribution to the SD journey by designating 2005-2014 as the Decade of Education for Sustainable Development (ESD), appointing United Nations Educational, Scientific and Cultural Organization as the lead agency for its promotion. The basic vision of the DESD is a world where everyone has the opportunity to benefit from quality *education* and learn the values, behaviour and lifestyles required for a sustainable future and for positive societal transformation. This translates into four objectives of i. facilitating networking, linkages, exchange and interaction among stakeholders in ESD; ii. fostering an increased quality of teaching and learning in education for sustainable development; iii. Helping countries make progress towards and attain Millennium Development Goals through ESD efforts; and iv. providing countries with new opportunities to incorporate ESD into education reform efforts (DESD, 2005).

In turn, the use of acronyms or acrostics in education as teaching and learning strategies has been evident for decades. Students are introduced to acronyms early in education to assist memory, such as learning the names of the planets to principles of trigonometry. BODMAS is an example of an acronym which is commonly used in the maths curriculum and is used to explain the order of precedence whereby:

Brackets

powers

Division

Multiplication

Addition

Subtraction

(Source: BBC, 2009)

This paper demonstrates the use of a formulated approach used in construction management to increase the awareness of students of the importance of team effort in achieving goals, and is applicable to other areas of management. The word “team”, normally suggests a sporting context; however, in the built environment, many projects require a multi-disciplinary approach and the construction sector is a prime example. Sir Michael

Latham's report, aptly named *Constructing the Team* (1994), has highlighted problems and solutions in the construction industry. However, even when a team is constructed, team effort is required.

The sporting management analogy remains relevant, as those engaged with sport administration, coaching, sports science and management also need sound team engagement. The basic appraisal of sports coaching requiring a balance across the key elements of (Instruction + Teaching + Training) (NCF, 2005) serves to consolidate the need for robust and transparent learning systems, supporting this concept of a formulated and integrated approach.

2 Literature Review

“Learning relates to how we perceive and understand the world and how we develop meaning” (Marton & Booth, 1997). It is also...

“...about change: the change brought about by developing a new skill, understanding something new, changing an attitude...is a relatively permanent change, usually brought about intentionally and purposefully”.

Reece & Walker, 2003, p.59.

However, not everyone learns in the same way which is an important consideration for lecturers in education (Fry *et al.*, 2003). Indeed, it is hypothesised that the approach to learning which a student employs is both personal and situational (Ramsden, 1988). It is recommended that lecturers should consider how to bring about change or transformation to the pre-existing knowledge of their learners (Mezirow, 1991).

Different approaches to learning exist which is regarded as...

“...the way in which anyone goes about learning... a relation between the person and the material being learned”.

Ramsden, 2003, p.41.

Approaches to and successes in learning are linked to the motivation of the students to learn (Reece & Walker, 2003). This motivation relates to whether the students are determined by outcomes rather than their understanding of the subject (Reece & Walker, 2003). The works of Marton (1974), Pask (1976), Entwistle (1986), Ramsden (1988) and Biggs (1987) have conducted numerous research studies into the area of learning approaches. Their investigations have led to three main approaches - the Surface Approach; the Deep Approach and the Strategic Approach, which will now be discussed.

The main characteristics of the surface and deep approaches to learning are contained in the work of Ramsden (2003). In simple terms, surface learning is about quantity without quality; deep learning is about quantity and quality (Biggs, 1989). The *surface* approach to learning is the '*intention only to complete task requirements*' (Ramsden, 2003, p.47) such as the intention to recall or reproduce lecture notes; the only aim is to pass the exam or assignment; no conception of the overall themes or concepts; failure to distinguish principles from examples. A student who employs a surface approach to learning undertakes the minimum amount of work. However, he or she can have a successful academic outcome although may have little understanding of what has been learned. Study and learning may be adequate but lack of understanding may result in not retaining the information following the completion of an exam or assignment. The surface approach, which merely entails a memorising exercise, will have flaws if the student is presented with tasks later which call upon him to utilise previous knowledge; then he or she may have difficulties understanding the concept. As lecturers, this surface approach to learning would not be conducive to learning as many of the modules on courses require underpinning knowledge of previous modules. Furthermore, this has further implications as graduates progress into employment in industry.

Meanwhile, the *deep* approach to learning is the '*intention to understand*' (Ramsden, 2003, p.47) and concepts can be related to existing knowledge and understanding; new information is organised and structured; the logic of the development is developed; and the significant points are determined. A student who employs a deep approach to learning is utilising previous knowledge of the subject and/or any experience relating to the subject area. This approach involves students looking for similarities in the subject area to previous knowledge and trying to understand, for themselves, where they have come from and where they are going to, in terms of their learning and their ability to assimilate information and develop conclusions. Deep learners work at a higher level than surface learners. They develop an interest in their subject and a desire to know more. This will allow them a greater understanding of the topic and allow them to question any areas which are unclear or which require further thought processing. A deep learner can become actively involved in the course and will carefully examine the logic behind the entirety of the course content.

Ramsden (2003) also states that there are two related aspects of an approach to learning: one concerned with *what* the student refers to and *how* the student structures the task.

Thirdly, the strategic approach typifies students who "*adapt their learning style to meet the needs of the task*" (Fry *et al.*, 2003, p.440). A student who engages a strategic approach (also known as the Achieving Approach) to learning is doing so in order to achieve the highest possible marks for their own sake but not necessarily to signify a high level of learning. A strategic learner can employ a number of tactics under this approach such as ensuring he or she has all the class and tutorial notes; all relevant material is in order and filed; time is allocated for studies, test and assessment procedures or assignment guidelines are accessible; and all topics and studies are learned . The strategic approach can use a combination of the surface and deep approaches to learning. A student who mainly uses a deep approach to

learning may adopt some form of the techniques of a surface learner in order to obtain a high grade. Thus, the deep approach is not a permanent approach of the student as achievement is mainly associated with the exam or assignment grade.

Although a number of learning styles have been discussed, it is not appropriate to label students into specific categories. Every student is part deep learner, part strategic learner and part surface learner. They may not be categorised into the same style of learning for every subject. Most learners have a primary learning style but it can vary depending on the subject and situation. Lectures must be designed so that everyone on the programme develops and adapts their level of learning.

Felder & Silverman (1988) concluded that the preferred teaching style of most engineering faculties was not meeting the best learning style of engineering students. Different students have their own individual methods of remembering information, showing creativity and demonstrating understanding. These methods can include mind mapping and the use of acronyms.

Mind mapping is a technique which enhances creativity and promotes the individuals' learning (Mento *et al.*, 1999). This technique is useful to ensure that students can recall knowledge whilst also being able to show the links between different thoughts and concepts (Buzan & Buzan, 1995; Buzan, 2002; Buzan, 2005).

Studies such as those conducted by Stalder (2005) have shown that the use of acronyms consistently predicted higher performance in an acronym related exam, and helpful in increasing their motivation to study. However, others have questioned their effectiveness (Carlson *et al.*, 1981; Carney *et al.*, 1994). Lecturers continue to aim to facilitate students' learning, especially in the creation of long-term memory (Herbert & Burt, 2004).

3 Research Methodology

Students were given a presentation entitled “*How can construction management influence the direction and focus of sustainability?*”. The following slides (Figures 1-4) are part of this PowerPoint presentation. They depict the TEAM EFFORT formula.

3.1 TEAM EFFORT Formula

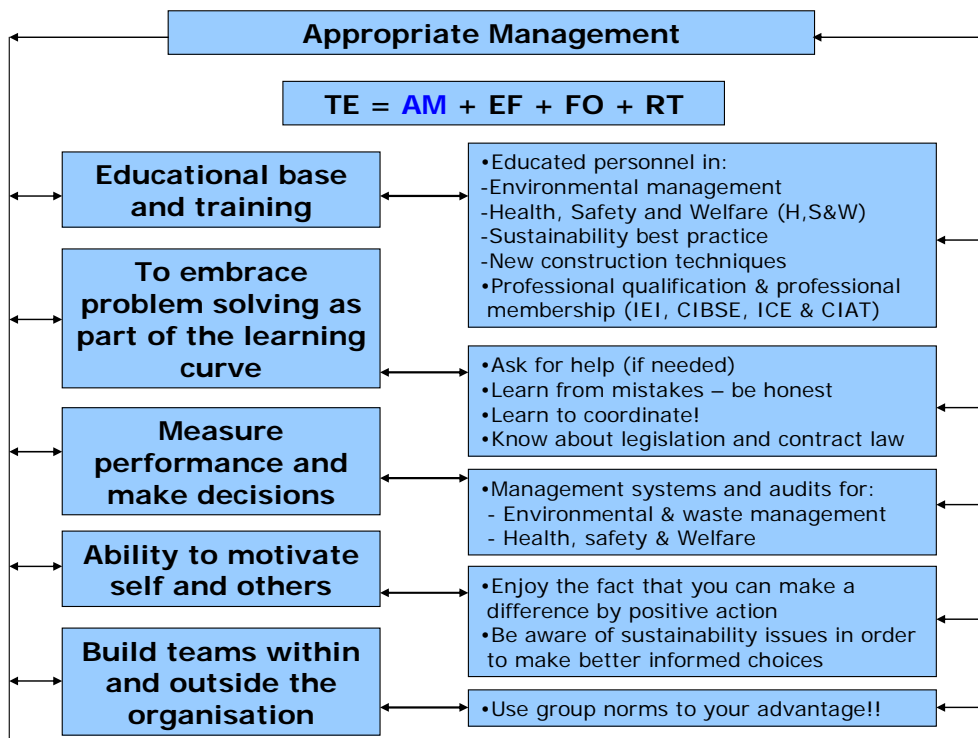


Figure 1. Appropriate Management

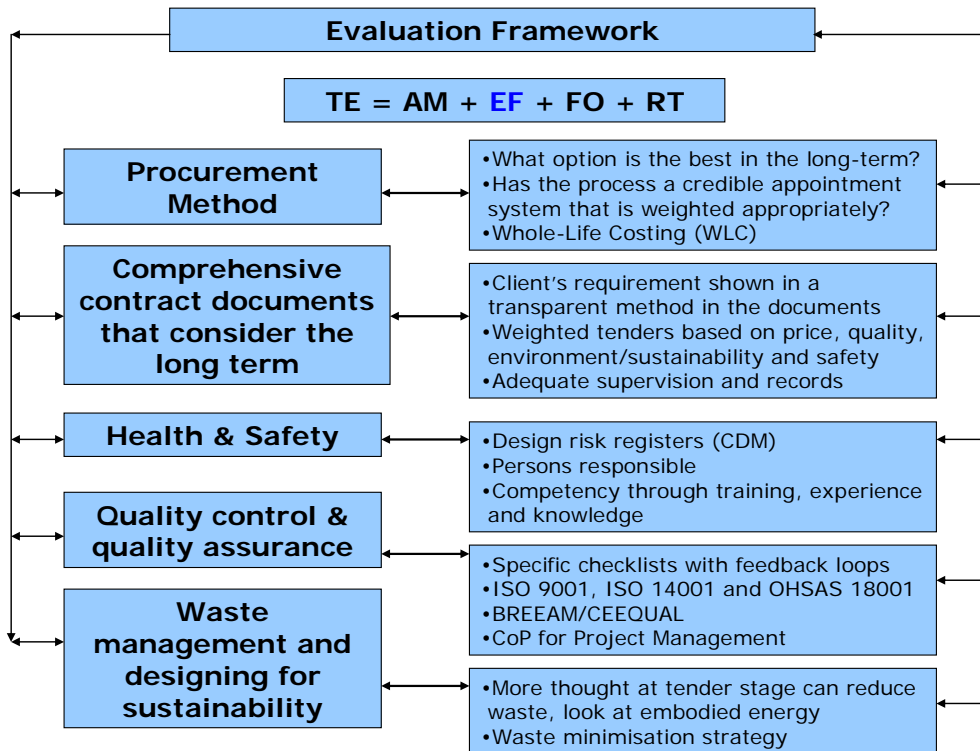


Figure 2. Evaluation Framework

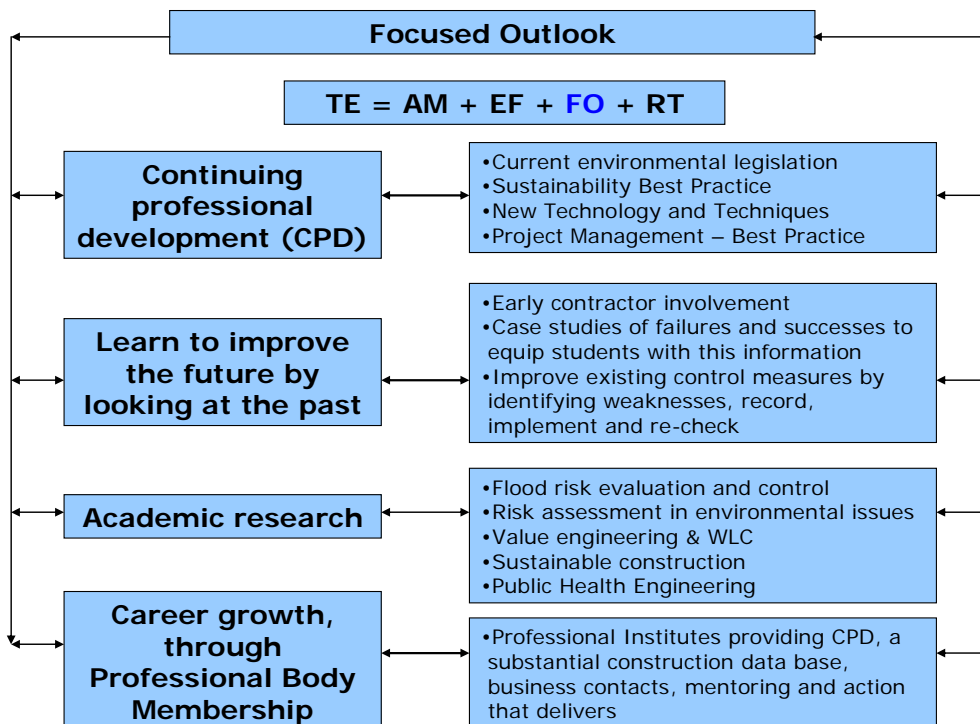


Figure 3. Focused Outlook

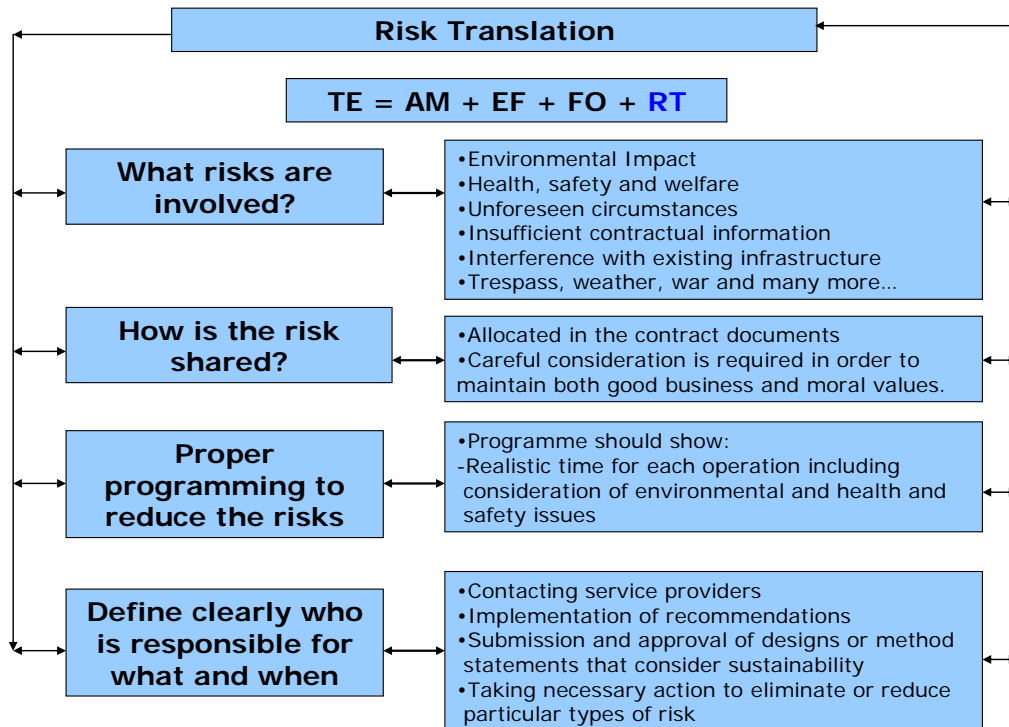


Figure 4. Risk Translation

The following commentary gives an explanation of the significance of the slides:

3.1.2 *Appropriate Management*

The level of management required will depend on the task; however, an effective manager should have an appropriate educational base, and knowledge and training to develop the competence levels required.

Managers must be able to measure performance and to take decisive actions. The ability to motivate oneself and others is another key attribute of an effective manager. Management must be able to facilitate the smooth running of a contract or project through effective coordination and utilisation of the team. However, one attribute which may be absent in some managers is the ability to embrace problem-solving as part of the learning curve, as this often involves asking for help.

3.1.3 *Evaluation Framework*

As professionals, choices must be able to stand scrutiny. The important choices relate to elements such as procurement method, health and safety, quality control and waste management. Evaluation frameworks must include the need for checklists that are based on learning from the failures of the past. For this reason, checklists must be updated using feedback loops. Evaluation must involve consideration of new technology and innovation. Early contractor involvement can prove helpful on complex schemes.

3.1.4 Focused Outlook

The focus for professionals includes preparing for the future by looking at the past. Case studies are a valuable learning tool to help inform and equip students and practising engineers with specific lessons on the application of theory. The need for Continuing Professional Development, as a means of consolidation and upgrading of knowledge and 'best practice' cannot be overstated when considering the future.

Research is also a valuable tool in order to improve the way that project managers make decisions. Of course, one of the main decisions that can assist career growth is professional body membership and its valuable learned society functions and services.

3.1.5 Risk Translation

The ability to evaluate risk is a critical skill in any project manager's skills base. Questions such as "what are the risks involved?" and "how are the risks shared?" need value judgements and the right answers. Of course, there are many approaches to controlling risk, the basis of which is to clearly define who is responsible for what and when.

In summary, a team effort is the utilisation of a myriad of skills that are required on varied projects. As engineers and professionals in any management field, it is important to realise that each one has limitations in terms of their skills base; however, it is this realisation that can help improve project management through team effort.

3.2 Research approach

The study was completed in three phases:

- a. During September-November 2009, the TEAM EFFORT formula presentation was delivered to a total of 136 university students on three separate dates. These students included disciplines from civil engineering, building services and architectural technologists;
- b. An initial control group of 50 students participated in providing feedback from a lecture entitled “Environmental Impact Assessment”. The students were asked if they could recall the main headings from the Environmental Impact Assessment (EIA) lecture.
- c. As a means of observing learning approaches and appraising the use of acronyms to motivate students and enhance their knowledge and understanding, over 100 students were informed of the TEAM EFFORT formula and a second control group was specifically tested under controlled conditions.

4 Findings and Discussion

4.1 The results of the first phase of the study are shown below.

Table 1. Summary of results

Q.	Question Description	Correct Answer (%)
1	What does TE stand for in the formula?	100
2	What does AM stand for in the formula?	76
3	What does EF stand for in the formula?	82
4	What does FO stand for in the formula?	62
5	What does RT stand for in the formula?	100

It was noted that students were also asked whether or not they thought that the formula was a useful method of remembering the lecture content. 100% of students replied that they thought it was useful.

The analysis from the immediate feedback following each delivery in *Table 1* shows an average of 84% were able to recall the main headings from the

lectures. The positive relationship of the use of acronyms to facilitate learning is in line with that of Stalder (2009) who found that students scored higher in tests and their use was favoured both by instructors and students

4.2 In order to derive a comparison between the use of the TEAM EFFORT formula presentation and a lecture which did not use acronyms, a control group of 50 students was used. The control group resulted in less than 65% of the students being able to recall the specific headings in the EIA lecture where acronyms were not used.

4.3 A control group of over 25 different students were surveyed on the TEAM EFFORT formula from basic non-acronym led teaching and were later surveyed having received the formal lecture as described in Section 3.1.

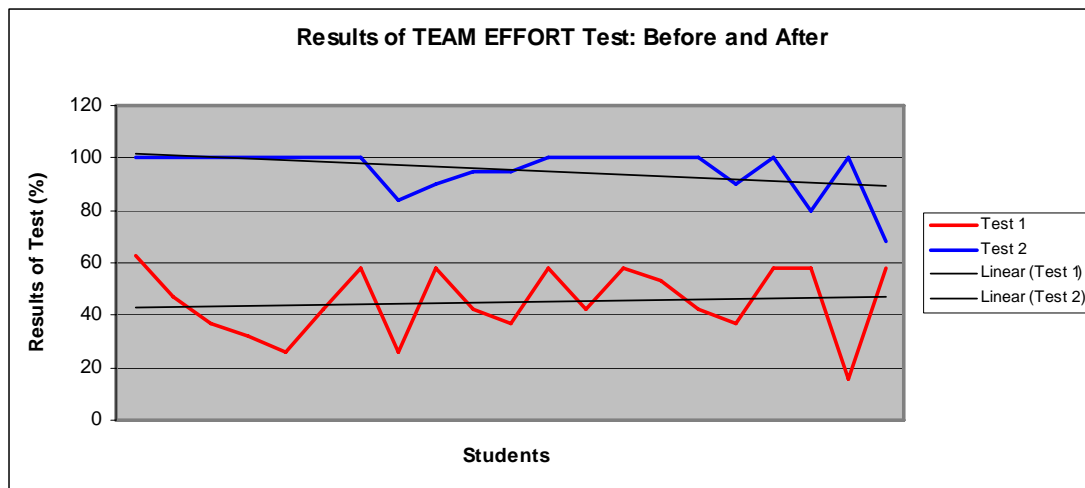


Figure 5. TEAM EFFORT Knowledge survey results

Table 2: Survey Statistics

	Student knowledge – before Lecture	Student knowledge – after Lecture
Average	45.1%	95.3%
Standard Deviation	13.3	8.6

Several comments were derived from this study which are illustrated in *Figure 5* and *Table 2*:

- a. The difference of knowledge between after and before the acronym led TEAM EFFORT lecture was on average 40%;
- b. All students showed this consistent improvement;
- c. Students expressed a remarkable surprise at the impact of the acronyms of the TEAM EFFORT formula in assisting to both recall and appraise the elements of a team-led approach;
- d. Students remarked on the benefit of a mixture of surface and deep learning strategies in developing greater synergies between elements of a team approach;
- e. Aspects of sustainability were recognised in the material, but the integrated thinking provided a basis for seeking a more holistic approach to complex issues.

5 Conclusion and Further Research

This study concluded that the use of the TEAM EFFORT formula as an approach to teaching management was effective for learning to take place which was evident through formative assessment with 100% of the students confirming that they found the formula to be a useful method of remembering the content of the lecture. Also, the two control group surveys gave a strong indication that the use of acronyms, set alongside deep level teaching, allowed students to accurately recall (95% success) details and to develop integrated solutions; this was confirmed by the lower performance in the non-acronym EIA lecture.

It is concluded that the use of acronyms as an effective teaching strategy is beneficial to both lecture and students. It is worth noting that students also stated that this approach should be used more in order to facilitate their long-term recall of lectures. These studies is regarded as a pilot which provides the basis for further research whereby a larger cohort could be used and a more statistical approach of assessing learning following lectures which involve the use of acronyms as part of the teaching strategy. The larger cohort and use of statistical analysis would provide a more substantiated study.

The evidence that sustainability is better delivered through a strategic approach in order to build a more inquisitive mind and a holistic viewpoint was only gained anecdotally, and this aspect requires further study and cross-referencing with literature.

6 Acknowledgement

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