

Developing a Model to Assess the Demonstrated Leadership of Postgraduate students at the University of the West Indies, Trinidad and Tobago.

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Abstracts

Stakeholders of the University of the West Indies, motivated in part by the Vice Chancellor, are focusing their efforts on transforming their (post)graduate ed. students into competent and effective leaders. To achieve this task, the existing theories concerning leadership and the various methods of assessment must be reviewed to determine the most suitable medium through which this objective may be achieved.

To accomplish this objective a model was created and tested during a thirteen (13) week course, known as Practical Team Project, in the Department of Civil and Environmental Engineering, to which the authors are affiliated. Within the course the students were assessed based on their demonstrated leadership of a team.

The leadership attribute of the students enrolled in the course was evaluated using two methods: one (1) being an innovative multi-rater technique, used by human resource managers, known as 360-degree feedback. This technique incorporates the traditional staff-student assessment along with modern diversified assessment methods in higher education, such as self and peer assessment. In the second method, zero tolerance, nine (9) of the fifteen (15) Development Objectives of the Institute of Civil Engineers (ICE) were used to assess the team goals as assigned by leader.

Based on the analysis and findings thus far, it can be said that the methodology selected for assessment, and the model to evaluate the demonstrated leadership attribute of the postgraduates prove suitable and favorable.

From the post evaluation, the students were asked to comment on the course, in particular the assessment, and some were found saying “they would recommend the course to others, the method of assessment was fair and the course was challenging, but manageable.”

On a global scale, this research could facilitate a shift from “leadership in theory” into “leadership in practice”, while introducing 360-degree feedback and zero tolerance into the wider body of assessment techniques currently being used in the Caribbean for higher education.

Introduction

The University of the West Indies is an autonomous regional institution supported by and serving sixteen (16) countries and territories in the Caribbean, and has been in existence for over sixty (60) years. Even with such a history it has only recently made initiatives with the advent of its 2007-2012 Strategic Plan, to move to outcome-based education: a student-centered learning philosophy through *learning outcomes*.

In the strategic plan, twelve (12) attributes are expected of the 2012 UWI Post Graduates. The Vice Chancellor, Professor E. Nigel Harris said that “*they should be competent and knowledgeable, **leaders** and team players, critical and creative thinkers, effective communicators, problem solvers, IT and information literate, socially and culturally responsive, ethical, innovative, entrepreneurial and life long learners*” (UWI 2007).

Based on the background the Department of Civil & Environmental Engineering sought to make this its mission, which in turn led to the definition of our programmes learning outcomes. To measure these learning outcomes it would require them being assess by either coursework or examination. A learning outcome is therefore something that a student has been assessed as being able to do (at pass level) after a period of learning.

Leadership in Focus

In the revision of the curricula for the programmes, a thirteen (13) week course entitled *Infrastructure Planning and Construction* had been restructured and renamed to *Practical Team Project* to address the new learning outcome, “**lead and work within teams**”. Leadership until now had been ignored and making leadership a learning outcome made measurement of such an outcome important. To achieve this challenge a model was developed to measure the **demonstrated leadership** of the postgraduate students

Leadership is defined by the Institute of Civil Engineers (ICE) as being capable of ‘setting the direction of a project or activity and encouraging and guiding people towards that direction’ (Steels 2006). Leadership is also defined by Peter Drucker as “management by objectives” (Drucker 1954). The combinations of these two views are adopted to develop the concept to measure the leadership of the postgraduates. Therefore, the demonstrated leadership attribute of the students would be assessed based on set objectives.

In review of the existing literature on leadership theories, Transactional Theory is the most suitable to meet this criteria. Based on *Transaction Theory*, a leader is one who is given power to perform certain tasks and receives reward or punish for the team’s performance. It gives the opportunity to the manager to lead the group and the group agrees to follow his lead to accomplish a predetermined goal in exchange for something else. Power is given to the leader to evaluate, correct and train subordinates when productivity is not up to the desired level and reward effectiveness when expected outcome is reached (Burns, 1978).

The objectives to be met have been adopted from the Development Objectives (ICE 3005) of the Institute of Civil Engineers (ICE) (ICE 2009) and the Project Management Book of Knowledge (PMBok) Areas (PMBok 2004). These nine (9) knowledge areas would be incorporated into the course Practical Team Project along with, nine (9) of the fifteen (15) Development Objectives for the postgraduate students as shown in Table 1.

Table 1: Coordination of Objectives for course: Practical Team Project

Week	Development Objectives	PMBok	Leadership	Coursework	Exam
1	Introduction				
2	Identify engineering problems and define possible solutions.	Project Scope management			
3	Conduct appropriate research and analysis relating to engineering problems	Project Risk management			
4	Plan for effective project implementation	Project Time management			
5	Control budgets, tasks, people and resources	Project Cost Management			
6	Develop people to meet changing technical and managerial needs	Project HR Management	Feedback Session		
7	Bring about continuous improvement through quality management	Project Quality Management			
8	Manage contractual issues	Project Procurement Management			
9	Communicate with others at all levels	Project Communication Management			
10	Demonstrate personal and social skills	Project Integration Management			
11	Submission of Project Charter within prescribed requirements	Able to meet Objective Set by Lecturer/ Client		Team Project	
12			Feedback Session		
13				Team Project Feedback	

Assessing Demonstrated Leadership of Postgraduates

As mentioned before a model was developed to measure the demonstrated leadership of the postgraduate students of the Department of Civil & Environmental Engineering. This model was developed based on the five (5) process groups of project management: Initiating, Planning, Executing, Controlling & Monitoring and Closing (PMBok 2004) (See Figure 1).

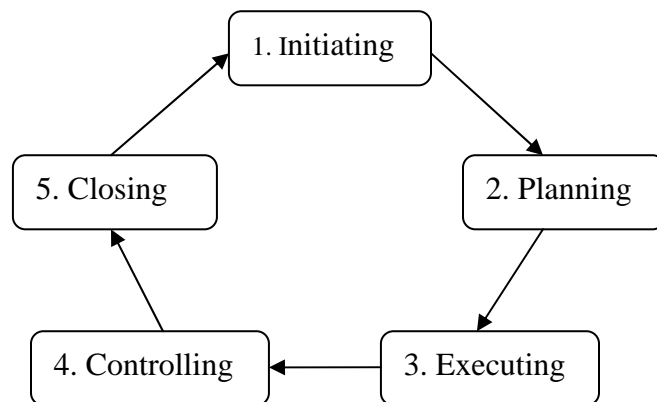


Figure 1 - Showing the five (5) processes of the Leadership Model.

In the leadership model each process has been given a definition that relates to the intention of the model, as indicated below:

1. *Initiating*: Assigning of teammates and selection of leader.
2. *Planning*: Organizing of team to meet set objective.
3. *Executing*: Leading team to meet assigned objective.
4. *Controlling*: Ensuring that the objective is met by teammates.
5. *Closing*: Assessment of demonstrated leadership.

In an attempt to test the initial validity of the model, a pilot study was conducted in the course as outlined in Table 1, through a semester (13 weeks). However, further development would be needed to determine the methodology to assess the demonstrated leadership of the students.

In measuring the leadership, innovative methods would have to be used. The class would be divided into teams, from which a leader would be selected on a weekly basis to meet the Development Objectives along with the PMBoK knowledge areas to create a Project Charter. The leaders would be assessed based on how best the team met the set objective of the week as indicated in Table 1.

In human resource management, leadership along with other attributes of employees has been evaluated with the aid of a technique known as 360 Degree Feedback. This technique provides individuals with formative feedback from subordinates, peers, and supervisors and also includes a self-assessment (see Figure 2). This method has also made its way into academia based on research conducted by (Rao and Rao 2005) in which the leadership trait of students was evaluated. This provided a formative means of assessment. Similar results as found in (Rao and Rao 2005) was evident in the work of (Ellis 2008), in which a bespoke 360 degree feedback (see Figure 2) was also used to evaluate the leadership and team playing attributes of the postgraduate students at the University of the West Indies. In both research, only subjective means of assessment was used through the avenue of a questionnaire.

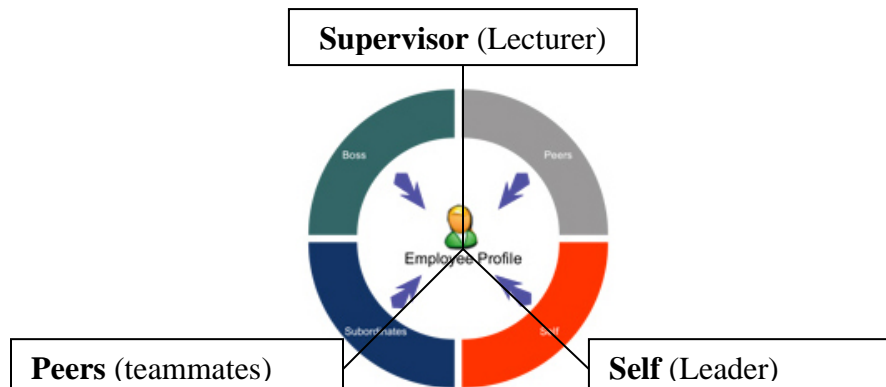


Figure 2 - Showing 360-degree feedback overlaid with the bespoke method used by (Ellis 2008).

In his research, (Ellis 2008) observed that the 360-degree feedback technique incorporated various assessment methods such as, self-assessment, peer-assessment

and the traditional staff-student assessment. In recent studies concerning assessment methods, self and peer assessments have proven capable of providing summative feedback (Mowl 1996, McDowell and Mowl 1996), which is used to assign a mark or grade to a student.

Thus far an objective method of assessment has not been determined. However, in research conducted by (Reynolds et al 2004), they developed an innovative idea of a zero tolerance to errors and omissions, which was at times coupled with 360-Degree Feedback. This was found to provide a reliable basis for assessing students' academic achievements.

These various methods of assessment were brought together and used in the leadership model. In Table 2, the various research components of the model along with the methods of achievement have been outlined.

Table 2 - Showing the research components of the Leadership Model

Components	Method of Achievement
Dependent Variable	Leadership
Independent Variable	Supervisor (lecturer and industry liaison), peers, and Self
Team Design	Class divided into teams of 4-6 members (ideally 5) (Reference needed): each team has one supervisor.
Set Objectives of Leaders	To produce components of a Project Charter using PMBoK as a guide (PMBoK 2009) based on nine (9) of the fifteen (15) Development Objectives (DO) of the ICE (ICE 2009).
Subjective Assessment	Questionnaire (10 questions on leadership) (Rao & Rao 2005)
Objective Assessment	Zero-Tolerance (Reynolds et al, 2004) for errors and omissions of teammates meeting the objectives assigned by leader based on set DO.
Formative Assessment	360-Degree Feedback (Rao & Rao 2005; Ellis 2008)
Summative Assessment	Peer, self and supervisor assessment along with Zero-Tolerance .
Post Evaluation Assessment	Conducted at the end of taught component of course for formative feedback to the process
Reliability	Cronbach's Alpha and Test/Retest Reliability for <i>Correlation</i> of data.
Validation	4 Types of Validity to be examined (conclusion, internal, construct, and external) at the confidence level of 5%.

Verification	Norm and Criterion Referencing (Wikipedia 2009) of data collected over three semesters.
Method of Analysis	Analysis of Variance (ANOVA).
Method of Data Collection	Manual and electronic collection of data

To coordinate the various components involved in the methodology of the model the following chart was developed (See Chart 1).

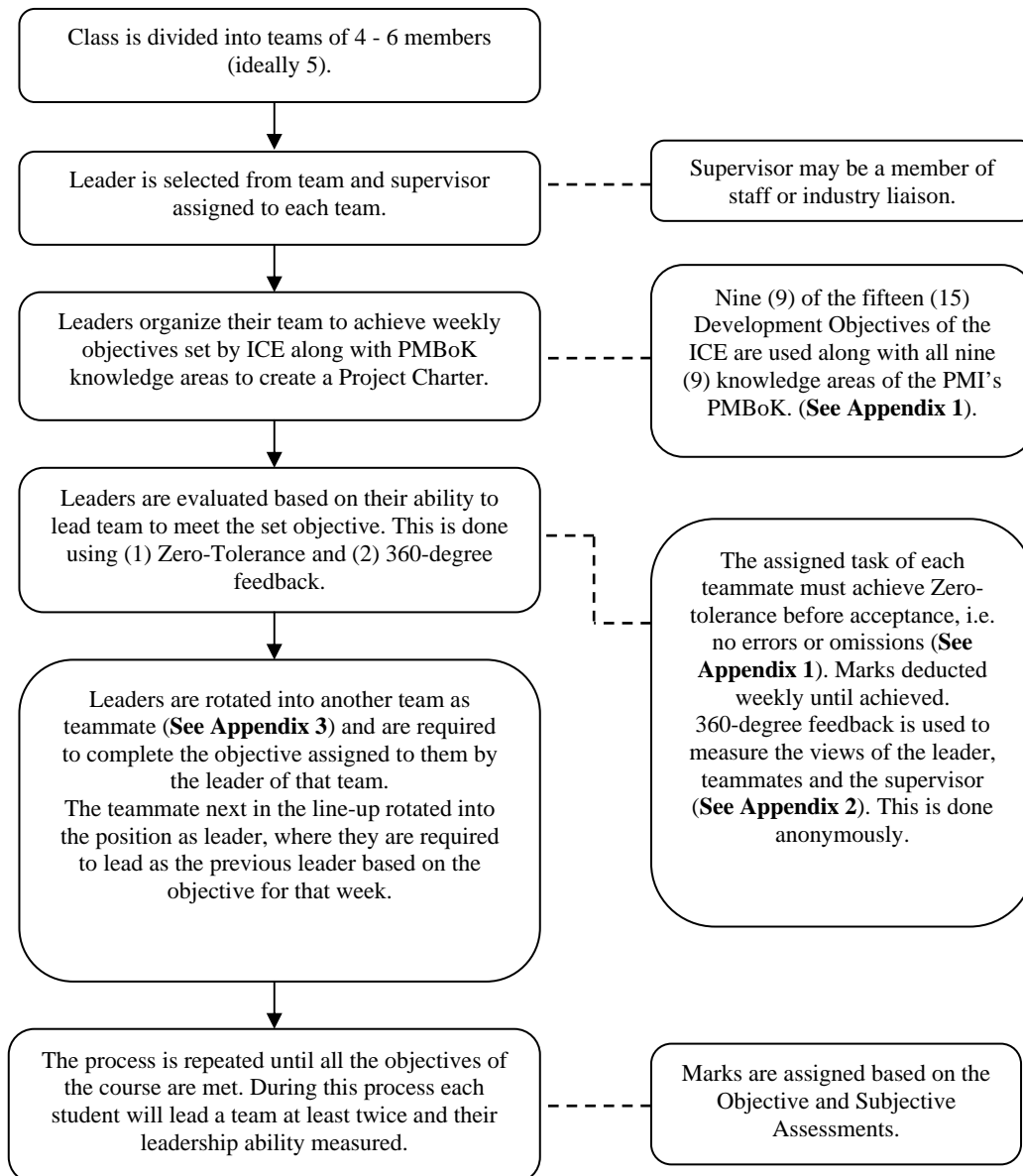


Chart 1 - Showing the flow of activities in the model.

Evaluating the assessment Load of Model

In designing the model the authors were mindful of over assessment of the students. This was of high interest as it was highlighted by the Joint Board of Moderators in its accreditation assessment of the Department (UWI 2004). In the Quality Assurance Report it was shown that;

“The students are expected to undertake a significant amount of coursework which includes investigative projects. They are developing their research skills, practical skills and communication skills from the first year. However, there is little feedback which means the students are not benefiting from this fundamentally good practice. This is in part due to the class sizes leading to an increase in the marking load. Alternative forms of assessment and a holistic view of the amount of assessment should be considered so that students can benefit from the learning experience.”

An investigation by Petersen & Baldeo (2008) in the academic year 2007/2008 had revealed that the undergraduate students at UWI when compared to those at the University of Portsmouth were over assessed. The outcome of the assessment artifact count was that University of Portsmouth students in four (4) years completed 84 assessment artifacts, UWI Civil Engineers 134 (+ or – 1) artifacts in three (3) years and UWI Electrical Engineers 186 (+ or – 2) artifacts in three (3) years.

To avoid recurrence of such practices the students' were required to produce a one (1) page assessment artifact to be handed in on a weekly basis; however, feedback was provided in class, each week, for each artifact. A post evaluation survey of the pilot study, via the means of an electronic questionnaire was performed to gain feedback from the students who responded favorably to the assessment method:

“The method of assessment was fair”, “the course was challenging, but manageable,” and “I would recommend the course to others.”

Conclusion

The Vice Chancellor of the University of the West Indies has put forwards twelve (12) desired attributes to be possessed by the graduates of the University. The Department of Civil & Environmental Engineering in attempting to meet this requirement has restructured its MSc programmes to include these attributes as its learning outcomes. One such learning outcome was to “lead and work within teams”.

In the revision to the MSc programmes a thirteen (13) week course renamed Practical Team Project was selected to address this particular learning Outcome. A model was developed to measure the demonstrated leadership attribute of the students based on the five (5) group processes of project management. This model was also based on the Transactional Theory of leadership. It incorporated the Development Objectives of the Institute of Civil Engineers (ICE) and the PMBok’s Knowledge Areas of the Project Management Institute (PMI).

A pilot study was conducted using the model to determine its efficiency and effectiveness in assessing the demonstrated leadership of the students. In assessing this attribute innovative assessment techniques such as 360-Degree Feedback and Zero Tolerance were used.

Due to the nature of the model one page assignments were required on a weekly basis. However, over assessment was taken into consider and feedback given on for each artifact on a weekly basis.

A post evaluation survey was done to gather feedback from the students on the development of the model and its assessment. The students were found to have given positive feedback with comments such as “The method of assessment was fair”, “the course was challenging, but manageable,” and “I would recommend the course to others.”

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About the Authors

Leighton Ellis is currently a Graduate Research Assistant, enrolled in a PhD program in the Department of Civil and Environmental Engineering at the University of the West Indies. Leighton's research is in the area of leadership assessment of postgraduate students using innovative techniques for student assessment as introduced by Andrew Petersen and others.

Andrew Petersen is currently a Senior Lecturer in the Department of Civil and Environmental Engineering at the University of the West Indies, having previously been a Principal Lecturer in the Department of Civil Engineering, at the University of Portsmouth, UK. Andrew has introduced a number of new assessment strategies for assessing student learning in the subject of Health and Safety Risk Management.

Appendices

Appendix 1 - Zero Tolerance Sheet

Appendix 2 - 360 Degree Feedback Questionnaire

Appendix 3 - Rotation Chart

Appendix 1 - Zero Tolerance Sheet

TITLE OF PROJECT:		
OBJECTIVE:		
INSTRUCTIONS:		
<ol style="list-style-type: none"> 1. Each team member is expected to complete the form based on the task assigned to them by their leader. 2. Report should be completed on this single sheet of paper for each Objective. 3. Students are expected to produce this report with zero-tolerance (to errors and omissions). If errors are found, the student will be asked to correct until the report is error free. Note that errors include grammar and spelling! 		
Name of Leader	Name of Team Member	
	Date Submitted	
TASK REPORT	Date Achieved	
Description of Task(s):		
Cited evidence, justification & evaluation:		
Conclusion(s):		
Reference(s):		

Appendix 2 - 360 Degree Feedback Questionnaire

Team Leader: _____

Leadership Evaluation	Teammate					Leader					Supervisor					Guidelines for "Strongly Agree" (5)
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
Takes initiative to organise team and ensures uncertainties are clarified																As team leader, it is important that there is clarity about the human resources that are essential and that these resources are organized to get the desired results.
Helps peers define clear objectives																Teams need to know with absolute clarity, what they are trying to achieve. Vague goals result in teams lacking that clarity.
Delegates authority; encourages independence																Successful team leaders recognize that greater benefits reside in the ideas of the team than in an individual and seek to leverage this range of expertise to achieve even better results.
Is decisive in taking action when needed																Lack of decisions usually translates into lack of action and lack of action leads to limited results.
exhibits high level of self confidence																A leader who conveys confidence towards the proposed objective inspires the best effort from team members.
Consistently looks for better ways of doing things																A leader continuously seeks means by which to improve the efficiency and effectiveness of the team.
Is open to ideas from all quarters to find new ways of solving problems																Successful teams create more ideas, options and potential solutions than any one individual could.
Strives to create an environment of collaboration, team spirit and trust																The leader has an important role in building the relationships within the team and with those stakeholders outside of the team who are essential to its success.
team with diverse background does not hinder the quality & quantity of their interactions																A Leader has the ability to work with persons from varying professions, nationality and ethnicity
Able to meet objectives set by Employer/Client																A Leader should have the ability ensure that the requirements of the employer/client are achieved by the team.

Rating	Description
1	Strongly Disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly Agree

Appendix 3 - Rotation Sheet

	Team 1 -					Team 2 -					Team 3 -				
Development Objectives	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Identify problems and define possible solutions.	Dark Green	Green	Light Green	Yellow	Light Yellow	Dark Green	Orange	Light Orange	Yellow	Dark Blue	Dark Teal	Light Teal	Cyan	Light Cyan	Light Blue
Conduct appropriate research and analysis relating to problems	Dark Green	Green	Light Green	Yellow	Light Yellow	Orange	Light Orange	Yellow	Dark Blue	Dark Teal	Light Teal	Cyan	Light Cyan	Light Blue	Dark Green
Plan for effective project implementation	Light Green	Yellow	Light Yellow	Dark Green	Orange	Light Orange	Yellow	Dark Blue	Dark Teal	Light Teal	Cyan	Light Cyan	Light Blue	Dark Green	Dark Green
Control budgets, tasks, people and resources	Yellow	Light Yellow	Dark Green	Orange	Light Orange	Light Orange	Dark Blue	Dark Teal	Light Teal	Cyan	Light Cyan	Light Blue	Dark Green	Dark Green	Light Green
Develop people to meet changing technical and managerial needs	Light Yellow	Dark Green	Orange	Light Orange	Yellow	Dark Blue	Dark Teal	Light Teal	Cyan	Light Cyan	Light Blue	Dark Green	Dark Green	Light Green	Yellow
Bring about continuous improvement through quality management	Dark Green	Orange	Light Orange	Yellow	Dark Blue	Dark Teal	Light Teal	Cyan	Light Cyan	Light Blue	Dark Green	Dark Green	Light Green	Yellow	Light Yellow
Manage contractual issues	Orange	Light Orange	Yellow	Dark Blue	Dark Teal	Light Teal	Cyan	Light Cyan	Light Blue	Dark Green	Dark Green	Light Green	Yellow	Light Yellow	Dark Green
Communicate with others at all levels	Light Orange	Yellow	Dark Blue	Dark Teal	Light Teal	Cyan	Light Cyan	Light Blue	Dark Green	Dark Green	Light Green	Yellow	Light Yellow	Dark Green	Orange
Demonstrate personal and social skills	Yellow	Dark Blue	Dark Teal	Light Teal	Cyan	Light Cyan	Light Blue	Dark Green	Dark Green	Light Green	Yellow	Light Yellow	Dark Green	Orange	Light Orange
Submission of Project Report within prescribed requirements	Dark Blue	Dark Teal	Light Teal	Cyan	Light Cyan	Light Blue	Dark Green	Dark Green	Light Green	Yellow	Light Yellow	Dark Green	Orange	Light Orange	Yellow
	L	TP	TP	TP	TP	L	TP	TP	TP	TP	L	TP	TP	TP	TP

L Leader
TP Teamplayer

