Student Evaluation of Teaching Index vs. Student's Self-Evaluation Index: Understanding the Impact of Teaching Performance on Student Satisfaction

Md. Mamunur Rashid[1], University of Massachusetts Lowell
Mahbub Ahmed[2], Southern Arkansas University
Khalil Dajani[3], Southern Arkansas University
Jobaidur Rahman Khan[4], Georgia Southern University
Haider Bhuiyan[5], University of North Georgia

Abstract

Though, there are useful metrics to evaluate academic research and scholarship (i.e., through refereed journal publications, funded proposals, etc.), research to identify effective ways to evaluate teaching at the college level continues. To evaluate classroom teaching performance, the most prevalent assessment tool that is currently being used is the end of semester quantitative student evaluation. In this evaluation scheme, students respond to a number of questions through numerical ranking. These questions are divided into two categories. Through Category 1 questions (i.e., whether student are prepared for class or if they are intellectually challenged by the course plan), students evaluate themselves. Based on their feedbacks, a numerical index, known as the Student's Self-Evaluation (SSE) Index is calculated. A higher index value typically indicates a higher level of the students' satisfaction. Through Category II questions, a teacher's performance and effectiveness on teaching is evaluated. Based on the students' feedback, a numerical index, known as the Student Evaluation of Teaching (SET) Index is calculated. The SET index can be seen as a measure of an instructor's achievements in teaching. Though, studies were conducted to understand the implications of SSE and SET in various manners, no comparisons has been made to correlate these two indices. The purpose of this work is to find the statistical correlations between these two indices.

Introduction

Research to identify effective ways to evaluate teaching at the college level is a continuing process. For assessing classroom teaching performance by instructor, the end of semester student evaluation is widely used. In this evaluation scheme, students respond to a number of questions through a numerical rating (i.e., 1 through 5). These questions can be divided into two categories.

In Category 1 questions, students evaluate themselves based on their learning experience. Examples of Category I questions include, "Were you prepared for class?" or "Were you intellectually challenged by the course plan?" Based on students' feedback, a numerical index, known as the Student's Self-Evaluation (SSE) Index can be calculated. The SSE is the average value of students' rating in response to each question. A higher index value typically indicates a higher level of students' satisfaction of their learning experience, and lower index value can be interpreted as a lower level of students' satisfaction.

In Category II questions, teacher's performance and effectiveness on teaching is evaluated. Examples of Category II questions include, "The degree to which important points were stressed in this course was?" or "Overall, how would you rate this course?" Like SSE, a numerical index, known as Student Evaluation of Teaching (SET) Index is calculated based on students' feedback. The SET is the average value of students' ratings in response to each question. The SET index can be seen as a measure of an instructor's achievements in teaching. A higher index value typically indicates higher level of instructor's performance as perceived by students and lower index value can be interpreted as lower level of instructor's performance as perceived by students.

The primary objective is to examine if a correlation exists between Student Evaluation of Teaching (SET) and Student Self Evaluation (SSE).

Previous Study

Among many tools or measure available to assess student learning and teaching effectiveness, the end-of-term course evaluation is the one that has been widely used. Student evaluation has long been used to measure instructor's teaching performance Even, tenure and promotion committees use student evaluations to assess teaching performance of an instructor (Brown, 2008; and Newport, 1996).

A relationship between student's satisfactions of instructor's teaching performance is generally expected. Stehle (2012) indicated that there is a strong relation between teaching evaluation and instructor performance.

The factors that contribute to teaching performance include instructor's preparation for the course, teaching method, effective student engagement, and course workload to name a few. Shea (2003) indicated that if an instructor provides a healthy learning (i.e., through enhanced interactions among students), it might lead to an optimum student learning process. Quality student engagement can also be very influential on student satisfaction as well as higher instructor rating by the students. The course workload may not affect student satisfaction it if the instructor is well prepared and is interactive with the students. Dee (2007) showed that interactions with students, teaching methods, and course preparation are important whereas course workload is merely insignificant in measuring SET index.

Students' satisfaction is generally reflected in terms of their expected grades in a course. Landrum et al. (2004) found that "expected grade" in a course have more influence on instructor ratings than the "actual grade". In addition to "expected grade", student provides higher rating to an instructor if they are motivated to learn and if they learn up to their potential (Wright et al., 2006).

Methodology

This study utilizes student evaluation data from several U.S. universities from the last several years. The evaluation data were collected from various engineering (civil engineering and

mechanical engineering), engineering technology (civil and mechanical), computer science courses as well as courses from other disciplines (i.e., Introduction to Arabic). The engineering courses include introductory and advanced undergraduate level, and graduate level – both lecture and laboratory based courses. The student satisfaction and teaching performance were measured based on the calculated SSE and SET indices.

The necessary data were gathered from student evaluation forms from five different institutions. The name of institution, discipline, and list of courses are provided in Table 1.

Table 1: The Data Summary of Institution, Disciplines and Course Lists from which Student Evaluation Rating were Obtained.

Name of institution and discipline	Course name		
University of Southern Indiana • Engineering	• Water Resources & Hydrology • Environmental Engineering • Engineering Economics	• Transportation Engineering • Introduction to Engineering I and II • Applied Problem Solving	• Principles of Problem Solving • Analytical Technique for Economic Evaluation
Georgia Southern University • Civil Engineering and Construction Management • Civil Engineering Technology • Mechanical Engineering • Mechanical Engineering Technology	• Highway Design I • Fluid Mechanics Lab • Project Cost Analysis and Management • Soil Mechanics/Lab • Environmental Pollution • Fluid Mechanics	• Water Supply & Wastewater Collection • System Dynamics of Rigid Bodies • Statics • Dynamics • Mechanics of Materials	• Heat Transfer • Engineering Graphics • Energy Science Laboratory • Solid Modeling & Analysis
Southern Arkansas University • Engineering Physics • Mathematics & Computer Science	• Introduction to Engineering • Heat Transfer • Software Engineering	• Industrial Materials • Database Management Systems	• Electrical Circuits • Survey of Information Technology with Applications
University of Texas El Paso • Mechanical Engineering	• Engineering Analysis	• Intro to Thermal-Fluid Science	Mechanics I – Statics
University of North Georgia • Department of Religion	• Elementary Modern Standard Arabic I and II	• Intermediate Standard Arabic I and II	• Advanced Standard Arabic II

For this work student evaluation forms has been gathered from 39 courses (Table 1) and eight disciplines.

Table 2 lists questionnaires which were used to obtain numerical responses (1 to 5) by students to calculate SSE and SET indexes in Georgia Southern University and University of Southern Indiana.

Table 2: Course Evaluation Questionnaires used by Georgia Southern University and University of Southern Indiana.

Questionnaire		
	Georgia Southern University (GSU)	University of Southern Indiana (USI)
Student-self Evaluation (SSE) Index	• How much effort did you put into learning the material covered in this course? • How much did you learn from this course? • To what degree were you intellectually challenged in this course? • How often did you seek outside help with this course? • How difficult was this course? • How was the workload of this course? • Overall, how would you rate this course?	• How much effort did you put into learning the material covered in this course? • How much did you learn in this course? • To what degree were you intellectually challenged in this course? • How often did you seek outside help with this course? • How difficult was this course? • How was the workload of this course? • What was your level of interest in this subject matter after taking this course?

Table 2: Course Evaluation Questionnaires used by Georgia Southern University
and University of Southern Indiana, continued..

Questionnaire		
	Georgia Southern University (GSU)	University of Southern Indiana (USI)
Student's Evaluation of Teaching (SET) Index	• The degree to which important points were stressed in this course was • The instructor's preparation for this course was • The instructor's encouragement of class participation, discussion, questions was • Organization of the course material was • The clarity of the presentation of the course was • The degree to which tests and other graded activities reflected course content was • The instructor's availability to students was • The instructor's helpfulness to students was • The degree to which the class stayed focused on course objective was • The instructor's interest in the content (or material) of this course was • Overall, how would you rate this instructor? • What was your level of interest in this subject matter before taking the course? • What was your level of interest in this subject matter after taking this course?	• Overall, how would you rate this course? • The degree to which important points were stressed in this course was • The instructor's preparation for this course was • The instructor's encouragement of class participation, discussion, or questions was • The organization of the course material was • The clarity of the presentation of the course material was • The degree to which tests and other graded activities reflected course content was • The instructor's availability to students was • The instructor's helpfulness to students was • The degree to which the class stayed focused on the course objectives was • The instructor's interest in the content (or material) of this course was • Overall, how would you rate this instructor? • What was your level of interest in this subject matter after taking this course? • What was your level of interest in this subject matter before taking this course?

The lists of questionnaire used by University of Southern Indiana and Georgia Southern University have been chosen as an example. To calculate the SSE index, seven questions were used both by these two institutions. To calculate the SET index, thirteen questions were used by GSU, and fourteen questions were used by USI. Finally, the SET and SSE indices were plotted in Microsoft Excel and the strength of relationships was observed for different institutions and instructors.

Results and Discussion

Figures 1 through 4 show relationships between the SSE and SET indices for different instructors and for different institution they have taught. For the ease of understanding, the instructor's name was used impersonally (i.e., Instructor No.). This order is based on author's order given in the abstract.

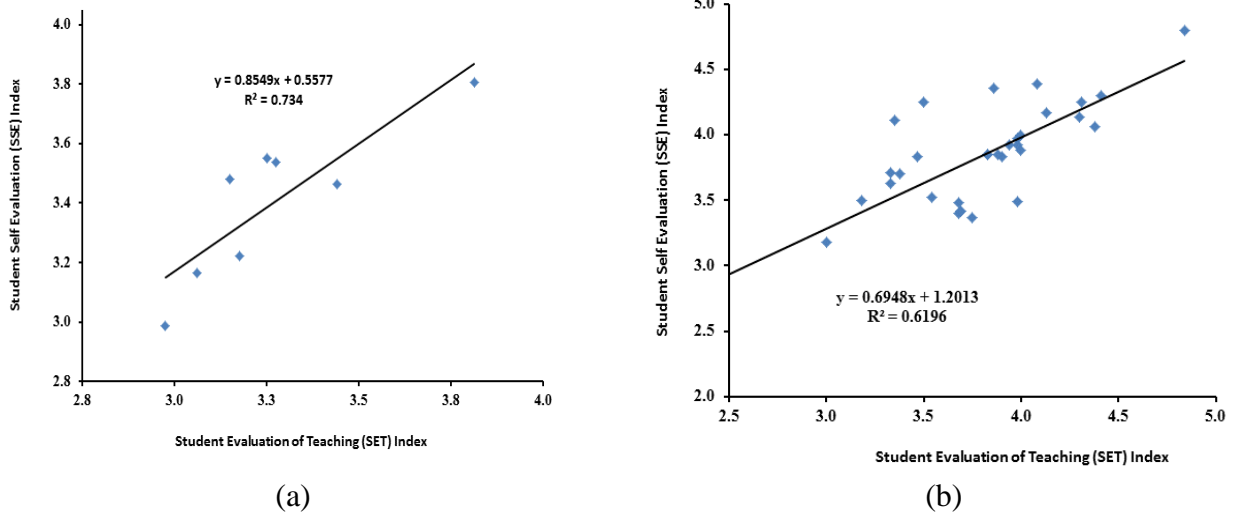(a)   (b)

Figure 1. Correlation between the SET and SSE indices, (a) Civil Engineering and Construction Management, and Civil Engineering Technology - Georgia Southern University taught by Instructor No. 1, (b). Engineering – University of southern Indiana taught by Instructor No. 1.

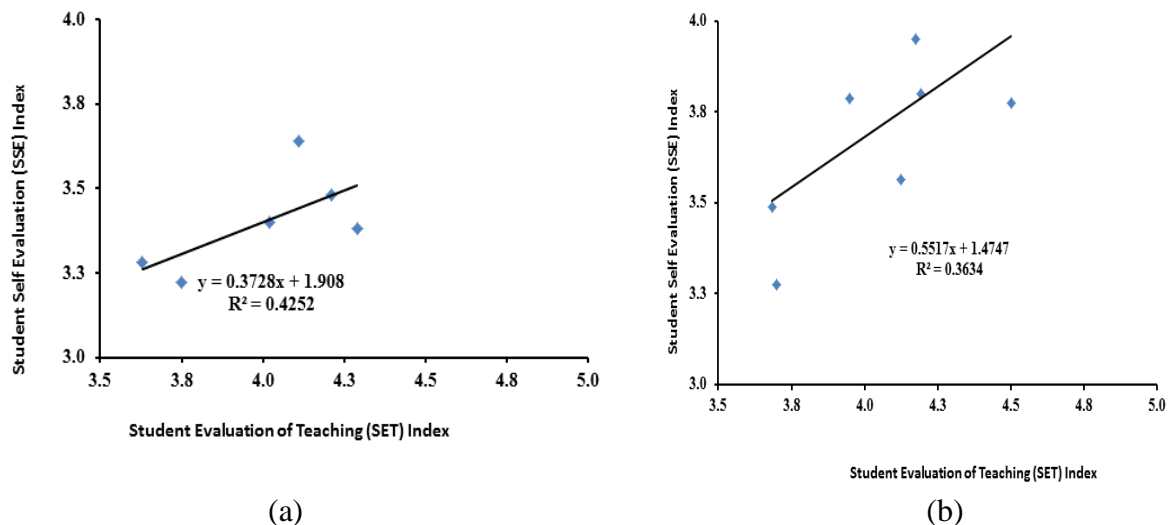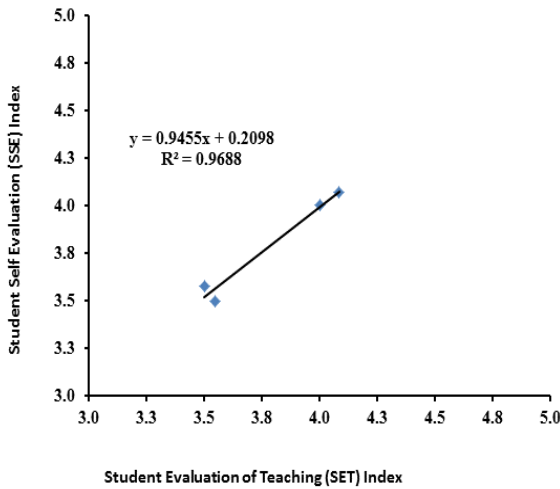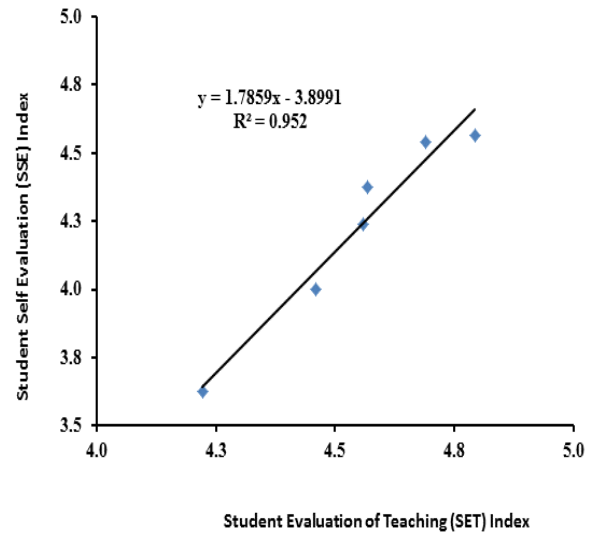(a)   (b)

Figure 2. Correlation between the SET and SSE indices, Mechanical Engineering and Mechanical Engineering Technology - Georgia Southern University taught by (a). Instructor No. 2 and (b). Instructor no. 4.
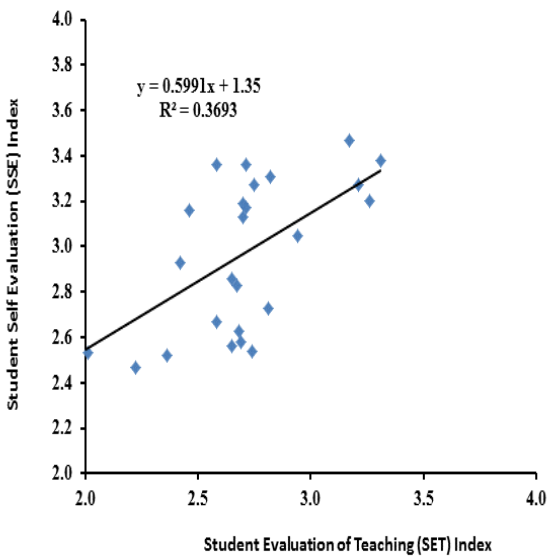
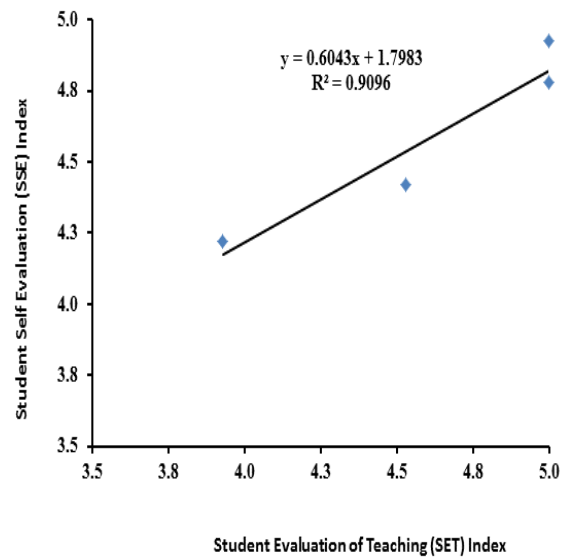(a)   (b)

Figure 3. Correlation between the SET and SSE indices, (a). Engineering Physics – Southern
Arkansas University, taught by Instructor No. 2, (b). Mechanical Engineering – University of Texas
El Paso, taught by Instructor No. 2.

(a)   (b)

Figure 4. Correlation between the SET and SSE indices, (a). Department of Religion –University of
Georgia taught by Instructor No. 5, (b). Mathematics & Computer Science – Southern Arkansas
University, taught by Instructor No. 3.

Figures 1 through 4 indicate that the SET index generally increase with the increase of the SSE
index. The strength of positive correlation is described using coefficient of correlation (R^2)

value obtained by plotting linear trend line. Figure 1 shows that strong correlations exist between the SSE and SET indices for Instructor No. 1. The R^2 values obtained are 0.73 and 0.62 for Georgia Southern University and University of Southern Indiana University, respectively.

Instructor No. 2 taught a wide variety of mechanical engineering, engineering technology and engineering physics courses at three different institutions including Georgia Southern University, the University of Texas at El Paso, and Southern Arkansas University. The higher R^2 values are obtained for Southern Arkansas University (i.e., $R^2 = 0.9688$) and smallest R^2 (i.e., $R^2 = 0.4252$) is obtained for are for Georgia Southern University.

Graduate level computer science courses were taught by Instructor No. 3 at SAU and some undergraduate mechanical engineering and technology courses were taught by Instructor No. 4 at GSU. The R^2 values obtained were found to be moderate. The courses taught by Instructor No. 5 are in the areas of non-engineering or non-technology at the University of Georgia. A weaker relationship ($R^2 = 0.3693$) was found between the SSE and SET indices for this instructor.

These aforementioned figures show a wide variety of relationships between SET and SSE indices among the instructors and the institutions they have taught. A summary of these relationships are provided in Table 3.

Table 3. Data Summary of Coefficient of Correlation Values Obtained for Different Courses at Different Institutions

Strength of relationship (R^2 value)	Number of data points (i.e., number of courses)	Instructor No.	Course and institution names
0.9688	4	2	Engineering Physics – Southern Arkansas University
0.952	6	2	Mechanical Engineering – University of Texas El Paso
0.9096	4	3	Mathematics and computer Science – Southern Arkansas University
0.734	8	1	Civil Engineering and Civil Engineering Technology - Georgia Southern University
0.6196	34	1	Engineering – University of Southern Indiana
0.4252	6	2	Mechanical Engineering/ Technology - Georgia Southern University
0.3693	26	5	Department of Religion – University of Georgia
0.3632	7	4	Mechanical Engineering and Mechanical Engineering Technology - Georgia Southern University

Table 3 indicates that largest R^2 value is obtained for courses taught by Instructor 2 and smallest R^2 value is obtained courses taught by Instructor No. 4. A general positive relationship between the SSE and SET indices is observed in varied range. However, no conclusion can be drawn for relationship among R^2 values, number of courses taught, instructor and institutions.

Summary and Conclusions

A correlation is found between the SET and SSE indices which, indicates that student satisfaction is related to teaching performance. However, a wide variation of R^2 values among the instructors and the institutions are observed. The highest coefficient of correlation (R^2) was observed for the data set obtained from courses taught by Instructor No. 2 at Southern Arkansas University and the lowest coefficient of correlation (R^2) was observed for data set obtained from course taught by Instructor No. 4 at Georgia Southern University. The strength of relationship between the SET and SSE indices varies and it generally depends on many factors including instructor's preparation, teaching style, dedication, ability to motivate student, course types and discipline, to name a few. Teaching styles and ability to motivate student may have the greater impact on these variations. This observation is supported by Marsh (1997), which shows that student evaluation of teaching depends on the instructor's performance who teaches the course rather than the course itself. The class size, course type, and instructor's teaching experience are also influential factors that contribute instructor ratings. Nonetheless, the results presented in this work indicate that students' evaluation of teaching is positively related to students' perception of their learning.

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