

Exploration of The Difference Between Students' Self Evaluation and Professionals' Assessment For Student Outcome

Wen Cheng

Bengang Li

College of Engineering, California State Polytechnic University, Pomona

OUTLINE



INTRODUCTION



DATA
DESCRIPTION



METHODOLOGY



RESULTS



CONCLUSION
AND FUTURE
DEVELOPMENT



INTRODUCTION

- ▶ The study aims to compare the differences between **student self-evaluation** and **advisors' assessments** on 11 Civil Engineering student competences by the analysis of variance (ANOVA).
- ▶ **Senior Exit Survey** data were collected by the civil engineering department from students about to obtain their diploma.
- ▶ **Senior Project Assessment** data are each group of students' competency evaluation scored by advisors after students finished their senior project.
- ▶ From 2013 to 2019, there were 662 individuals completed self-evaluation on 11 questions defined the level of competence in student survey data.
- ▶ Using R-Studio to process and analyze the student data.

DATA DESCRIPTION

Questions Selected from the Senior Exit Survey (Student Self-Evaluation)

Question ID	Description of Student Learning Outcomes
a	Ability to apply knowledge of mathematics, science, and engineering.
b	Ability to design and conduct civil engineering experiments, as well as to analyze and interpret data.
c	Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
d	Ability to function on multidisciplinary teams.
e	Ability to identify, formulate, and solve engineering problems.
f	Understanding of professional and ethical responsibility.
g	Ability to communicate effectively.
h	Understanding of the impact of engineering solutions in a global, economic, environmental, and societal context.
i	Recognition of the need for, and an ability to engage in life-long learning.
j	Knowledge of contemporary issues and their importance to engineering systems.
k	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

DATA DESCRIPTION

Questions Selected from the Senior Project Assessment (Advisor Assessment)

Question ID	Description of Student Learning Outcomes
1(a)	Ability to apply knowledge.
2(k)	Use of engineering techniques and tools.
3(e)	Ability to gather data and solve engineering problems.
4(c)	Ability to design a system.
5(h)	Understanding of outside constraints & contemporary.
6(g)	Quality of visual presentation.
7(g)	Quality of oral communication.
8(d)	Ability to function on an interdisciplinary team.
9(c)	Level of design experience.
10(i)	Ability to recognize the need for and be able to pursue lifelong learning.
11(j)	Awareness and understanding of contemporary issues and their interactions.

DATA DESCRIPTION

Descriptive Statistics of Adjusted Evaluation Outcomes

Question ID	Count of Responses						
	Good (3)	Moderate (2)	Poor (1)	N/A (0)	Rating Average*	Groups (S/T)	Total Response Count
1(a)	247	175	1	1	2.58	T	424
(a)	290	370	2	0	2.44	S	662
2(k)	269	150	0	5	2.64	T	424
(k)	247	411	1	3	2.37	S	662
3(e)	229	190	3	2	2.54	T	424
(e)	265	395	2	0	2.40	S	662
4(c)	214	200	2	8	2.51	T	424
(c)	175	484	2	1	2.26	S	662
5(h)	213	200	0	11	2.52	T	424
(h)	285	370	2	5	2.43	S	662
6(g)	279	141	0	4	2.66	T	424
(g)	312	346	1	3	2.47	S	662
7(g)	254	165	0	5	2.61	T	424
(g)	312	346	1	3	2.47	S	662
8(d)	268	143	1	12	2.65	T	424
(d)	342	318	1	1	2.52	S	662
9(c)	170	236	2	16	2.41	T	424
(c)	175	484	2	1	2.26	S	662
10(i)	126	68	1	20	2.64	T	215
(i)	377	279	2	4	2.57	S	662
11(j)	139	63	0	13	2.69	T	215
(j)	235	418	4	5	2.35	S	662

METHODOLOGY

- ▶ Hypothesis (H0): the advisor's assessment (T) will have no significant effect on students' self-evaluation (S).
- ▶ Analysis of Variance (ANOVA)
- ANOVA relies on F-distribution as the basis of the probability distribution and estimates F value by using the Sum of Square Within (MSWithin) and Mean of Square (MS) calculated by Sum of Square (SS) over Degree of freedom (Df)

$$SS = \sum_i \sum_j (Y_{ij} - \bar{Y}_{total})^2$$
$$SS_{within} = \sum_i \sum_j (Y_{ij} - \bar{Y}_i)^2$$

“i” represents the number of groups (i=1,2);

“j” represents the number of individuals (j=1, 2, ...,1086);

Y_{ij} is the j-th observation of the group i;

\bar{Y}_{total} is the average of all observations;

\bar{Y}_i is the average of observations in group i.

METHODOLOGY

- The calculation of mean of square (MS)

$$MS = \frac{SS}{n-r}$$
$$MS_{\text{within}} = \frac{SS_{\text{within}}}{r-1}$$

“n” means the overall number of individuals;

“r” means the total number of groups;

“SS” is the sum of squares

- F value

$$F = \frac{MS_{\text{within}}}{MS}$$

- Check F-distribution table to determine the significance level.

RESULT

P-Value Outcomes of 11 Questions

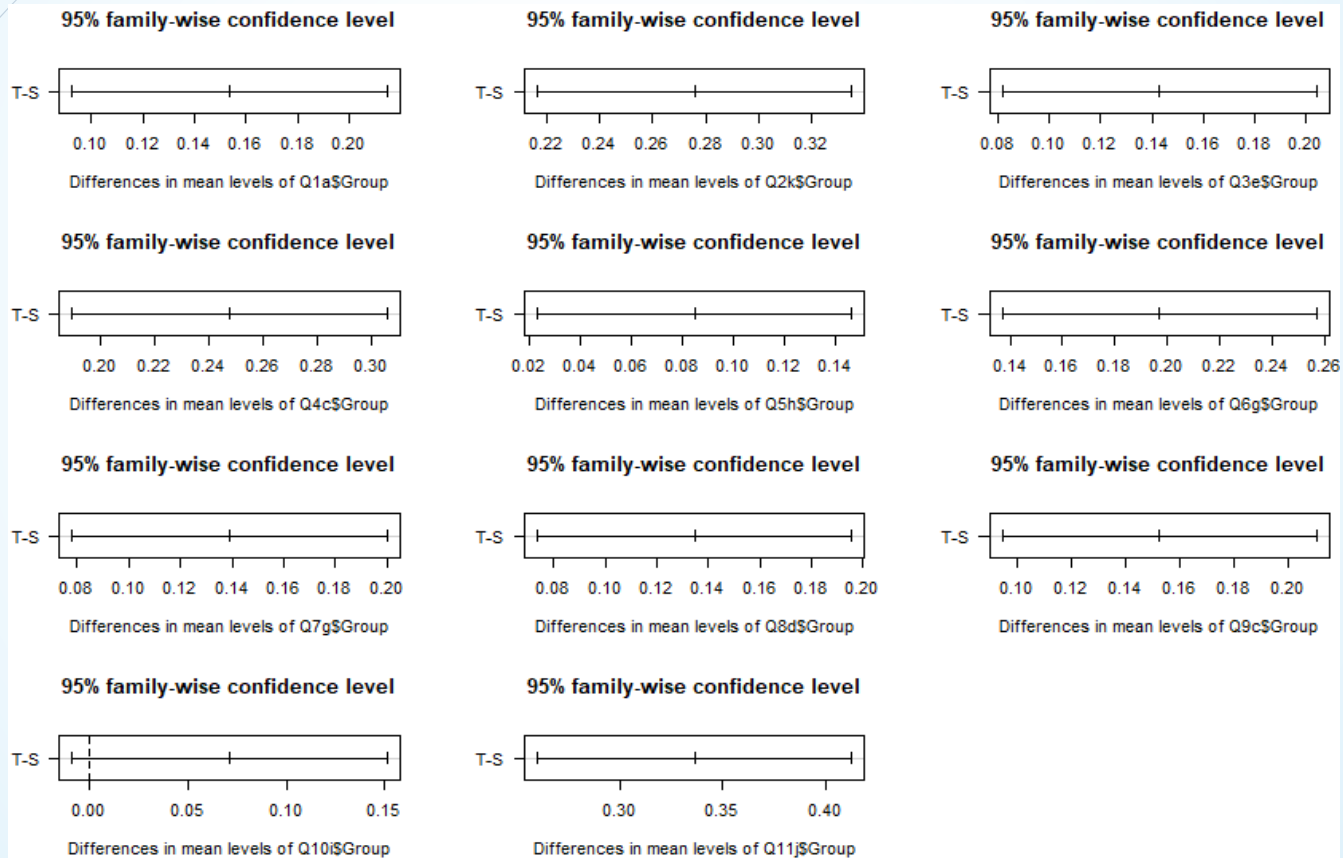
Question ID	1(a)	2(k)	3(e)	4(c)	5(h)	6(g)	7(g)	8(d)	9(c)	10(i)	11(j)
Pr (>F)	9.42e-07	<2e-16	5.50e-06	<2e-16	7.03e-03	1.85e-10	8.36e-06	1.64e-05	2.88e-07	8.10e-02	<2e-16
Codes	***	***	***	***	**	***	***	***	***	.	***

Notes: Significant. codes: 0 '****' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1.

- ▶ Advisor's Assessment (T) had highly significant effect on Students' self-evaluation (S) except for question 10(i), which is about student's ability to engage in life-long learning.

RESULT

Honestly Significant Difference (Tukey's HSD)





CONCLUSION

- ▶ Advisors' assessment had highly significant effect on students' self-evaluation.
- ▶ The scores of advisors' assessment were little bit higher than those of students' self-evaluation.
- ▶ Potential reasons:
 1. Students did not deem that they have acquired enough knowledge from this program while advisors believed they have been ready for work;
 2. Teachers have a better understanding of off-campus job requirements than students
- ▶ The school ought to appropriate adjust the education program and the implementation of the senior project for the sack of teachers and students can reach a consensus.



FUTURE DEVELOPMENT

- ▶ Make students follow the specified standards and requirements when doing self-evaluation To improve the accuracy of students' assessment of their abilities.
- ▶ Further analysis of more educational datasets using different models to improve the accuracy of research;

THANK YOU

