CHAPTER 4 RESULTS

4.1 Introduction

This chapter demonstrates two sections of outcomes regarding team-based learning (TBL). The first section aims to identify and analyze factors affecting TBL. Factor analysis (CFA) and LISREL^{TM} were used as the statistical tools. The second section displays the analysis and compared the differences between instructors' and students' perceptions of the factors affecting TBL in universities in Thailand by using a t-test. The tables summarize the results of the analysis of the survey data.

4.2 Results

The results of data analysis are classified into four parts and presented based on the objectives of this study. They are sequenced as follows:

4.2.1 Personal data: profile of respondents

4.2.2 Identification of instructors' perceptions of the factors affecting TBL in universities

4.2.3 Identification of students' perceptions of the factors affecting TBL in universities

4.2.4 Comparison of the differences between instructors' and students' perceptions of the factors affecting TBL in universities in Thailand

4.2.1 Personal data

In terms of the profile of the respondents shown in Table 4.1, sixty-three percent (or n = 170) of instructors were male and held a bachelor's degree (2.60% or n = 7), a master's degree (69.30% or n = 187) or a doctoral degree (28.10% or n = 76). The instructors' average age was 45 years, and they had an average of 17 years of teaching experience. Seventy-five percent of the participating students were majoring in Industrial Education and 65.30% were male. The programs in Industrial Education were civil technology education (17.70% or n = 51), mechanical technology education (22.22% or n = 64), production technology education (20.50% or n = 59), electrical technology education (19.10% or n = 55), electronics and telecommunication

technology education (16% or n = 46), and computer technology education (4.50% or n = 13).

Table 4.1 Profile of respondents: descriptive data

Profile of respondents	Number	Percentage
Gender (Instructors)		
Male	170	63.00
Female	100	37.00
Total	270	100.00
Highest educational level		
Bachelor's degree	7	2.60
Master's degree	187	69.30
Doctoral degree	76	28.10
Total	270	100.00
Age average (Years)	45	
Teaching experience (average in years)	17	
Gender (fourth year students)		
Male	188	65.30
Female	100	34.70
Total	288	100.00
Program in Industrial Education		
Civil Technology Education	51	17.70
Mechanical Technology Education	64	22.22
Production Technology Education	59	20.50
Electrical Technology Education	55	19.10
Electronics and Telecommunication Technology Education	46	16.00
Computer Technology Education	13	4.50
Total	288	100.00

4.2.2 Objective 1: To identify instructors' perceptions of the factors affecting TBL in universities

Table 4.2 explains 59.70% of the total variance. The results of the first-order correlation coefficients between 7 factors and 26 variables were 0.56-0.81.

Table 4.2 Factor analysis of instructor perceptions on TBL approach

Factor	Loading	Weight	Eigenvalues	
1. Authentic Assessment	3	0.62-0.76	3.28	10.58%
2. Knowledge Construction	6	0.58-0.70	3.08	9.96%
3. Active Learning	3	0.60-0.81	3.07	9.90%
4. Instructional Design	4	0.58-0.67	2.73	8.81%
5. Accountability	4	0.57-0.78	2.49	8.03%
6. The Value of Team	3	0.61-0.72	2.12	6.83%
7. Facilitation	3	0.56-0.77	1.72	5.56%

Figure 4.1 presents the correlation coefficients between the seven factors and TBL. The results were 0.52-0.87, which were at a high level. The correlation coefficients within the seven internal factors were 0.01-0.14, which were at a low level.

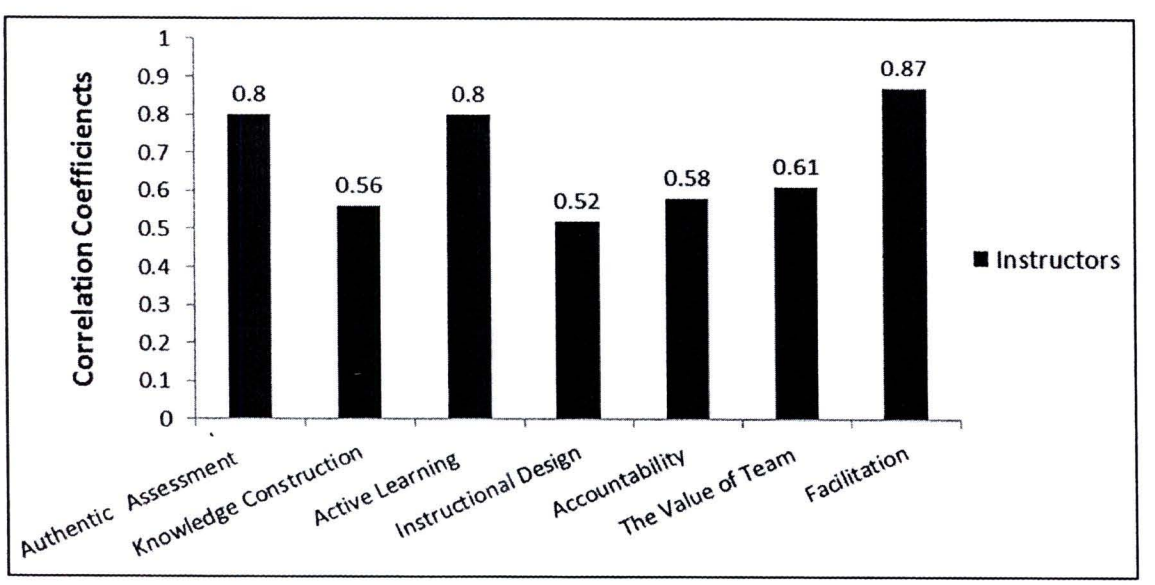

Figure 4.1 Correlation coefficients within the seven internal factors of instructors' perceptions of TBL

Figure 4.2 presents the model of second-order factor analysis and has factor loadings weighted 0.58-0.89. When the factors were ranked in terms of importance as perceived by instructors, the order was as follows: *Active Learning* (0.89), *Accountability* (0.75), *The Value of Team* (0.75), *Facilitation* (0.75), *Authentic Assessment* (0.66), *Knowledge Construction* (0.65), and *Instructional Design* (0.58)

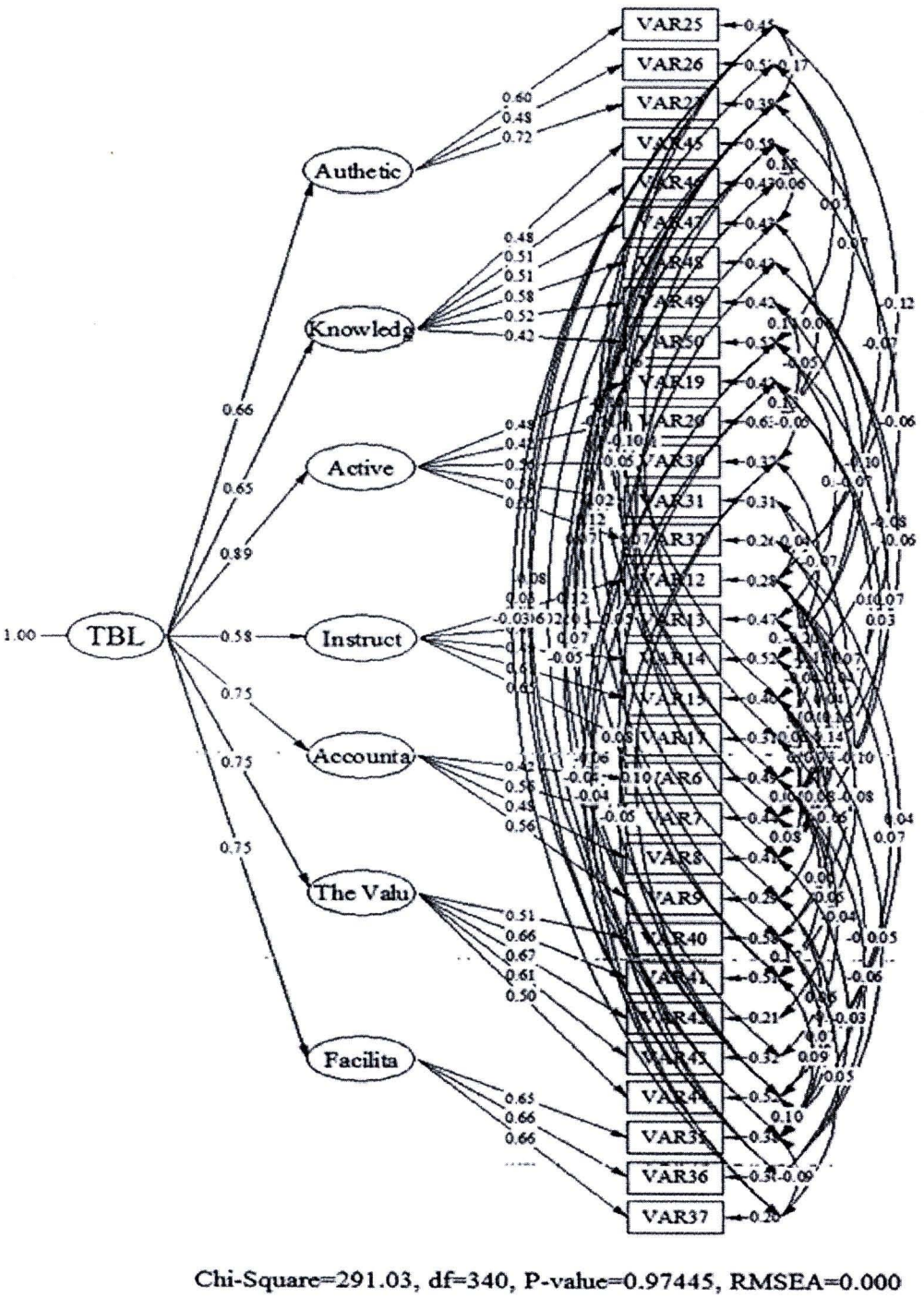

Figure 4.2 Second-order factor analysis of instructors' perceptions

Table 4.3 presents a model of the measurement of second-order factor analysis of instructors' perceptions which had highly satisfactory validity and fit the empirical data. The statistical values were as follows: χ^2 non-significant, p = 0.97, RMSEA = 0.00, ECVI = 2.42, Model AIC = 603.03, NFI = 0.99, CFI = 0.97, SRMR = 0.40, GFI = 0.93 and AGFI = 0.90. The fit indices were good which implies that the component model developed by the researchers is in accordance with the empirical data was at a high level.

Table 4.3 Instructor second-order factor analysis: Goodness-of-fit indices and empirical data

Fit indices	Standard	Value	Result	Summary
χ^2-Sig. (p)	>0.05	0.97	Pass	Good
RMSEA	<0.05	0.00	Pass	Good
ECVI	<ECVI for saturate model (3.69)	2.42	Pass	Good
Model AIC	<Saturated AIC (992)	603.03	Pass	Good
NFI	>0.90	0.99	Pass	Good
CFI	>0.90	0.97	Pass	Good
SRMR	<0.05	0.40	Pass	Good
GFI	>0.90	0.93	Pass	Good
AGFI	>0.90	0.90	Pass	Good

RMSEA = root mean square error of approximation; ECVI = expected cross-validation index; Model AIC = model Akaike's information criterion; NFI = normed fit index; CFI = comparative fit index; SRMR = standardized root mean square residual; GFI = goodness of fit index; AGFI = adjusted goodness of fit index.

Table 4.4 explains that seven factors resulted from factor analysis. However, using a LISREL™ analysis to confirm those seven factors, it was found that those seven factors of instructors' perceptions of TBL had good fit indices.

Table 4.4 Comparison of the results of the factor analysis and LISREL^{TM} analysis of instructors' perceptions

Factor	Factor Analysis	LISREL^{TM} Analysis
1. Active Learning	0.80	0.89
2. Accountability	0.58	0.75
3. The Value of Team	0.61	0.75
4. Facilitation	0.87	0.75
5. Authentic Assessment	0.80	0.66
6. Knowledge Construction	0.56	0.65
7. Instructional Design	0.52	0.58

4.2.3 Objective 2: To identify students' perceptions of the factors affecting TBL in universities

Table 4.5 explains 61.16 % of the total variance. The results of the first-order correlation coefficients between six factors and 22 variables were 0.51-0.80.

Table 4.5 Factor analysis of student perception of the TBL approach

Factor	Loading	Weight	Eigenvalues	
1. Active Learning	3	0.56-0.69	3.64	12.57%
2. Authentic Assessment	3	0.55-0.72	3.40	11.73%
3. The Value of Team	3	0.55-0.75	3.22	11.13%
4. Responsibility	5	0.58-0.68	2.52	8.72%
5. Problem Solving	4	0.51-0.80	2.48	8.56%
6. Instructional Design	4	0.58-0.71	2.44	8.44%

Figure 4.3 presents the correlation coefficients between six factors and TBL. The results were 0.52-0.79, which were at a high level. The correlation coefficients within the six internal factors ranged from 0.01-0.09, which were at a low level.

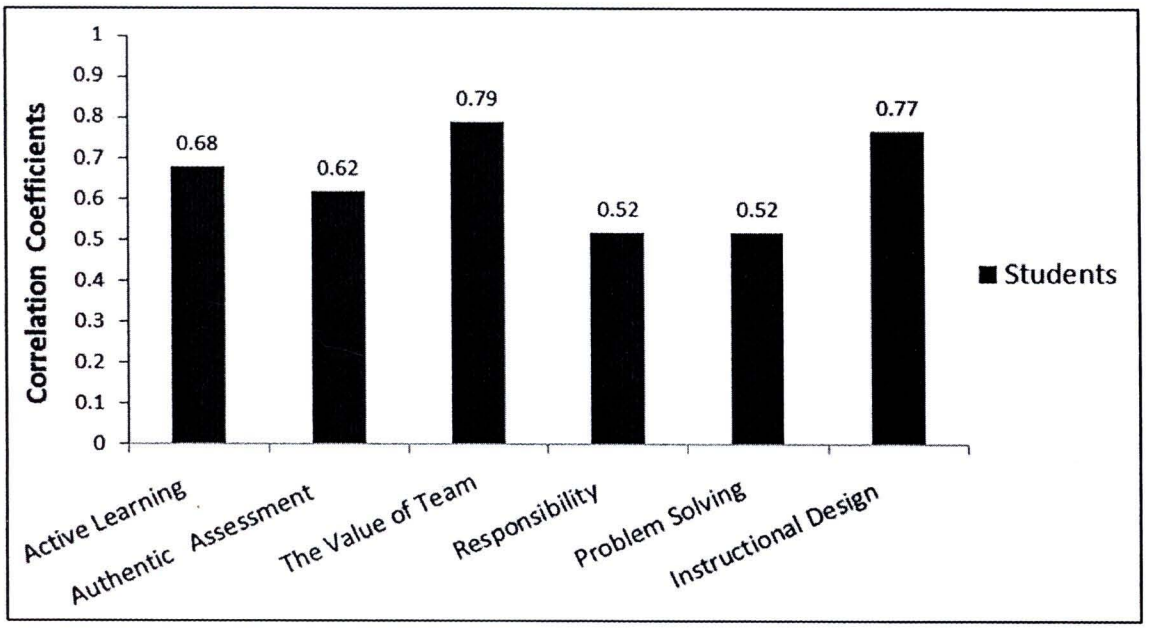

Figure 4.3 Correlation coefficients within the six internal factors of students' perceptions of TBL

Figure 4.4 presents the model of second-order factor analysis and has factor loadings weighted 0.60-0.93. When the factors were ranked in terms of importance as perceived by students, the order was as follows: *Problem Solving* (0.93), *Responsibility* (0.92), *Active Learning* (0.90), *Authentic Assessment* (0.87), *The Value of Team* (0.81), and *Instructional Design* (0.60).

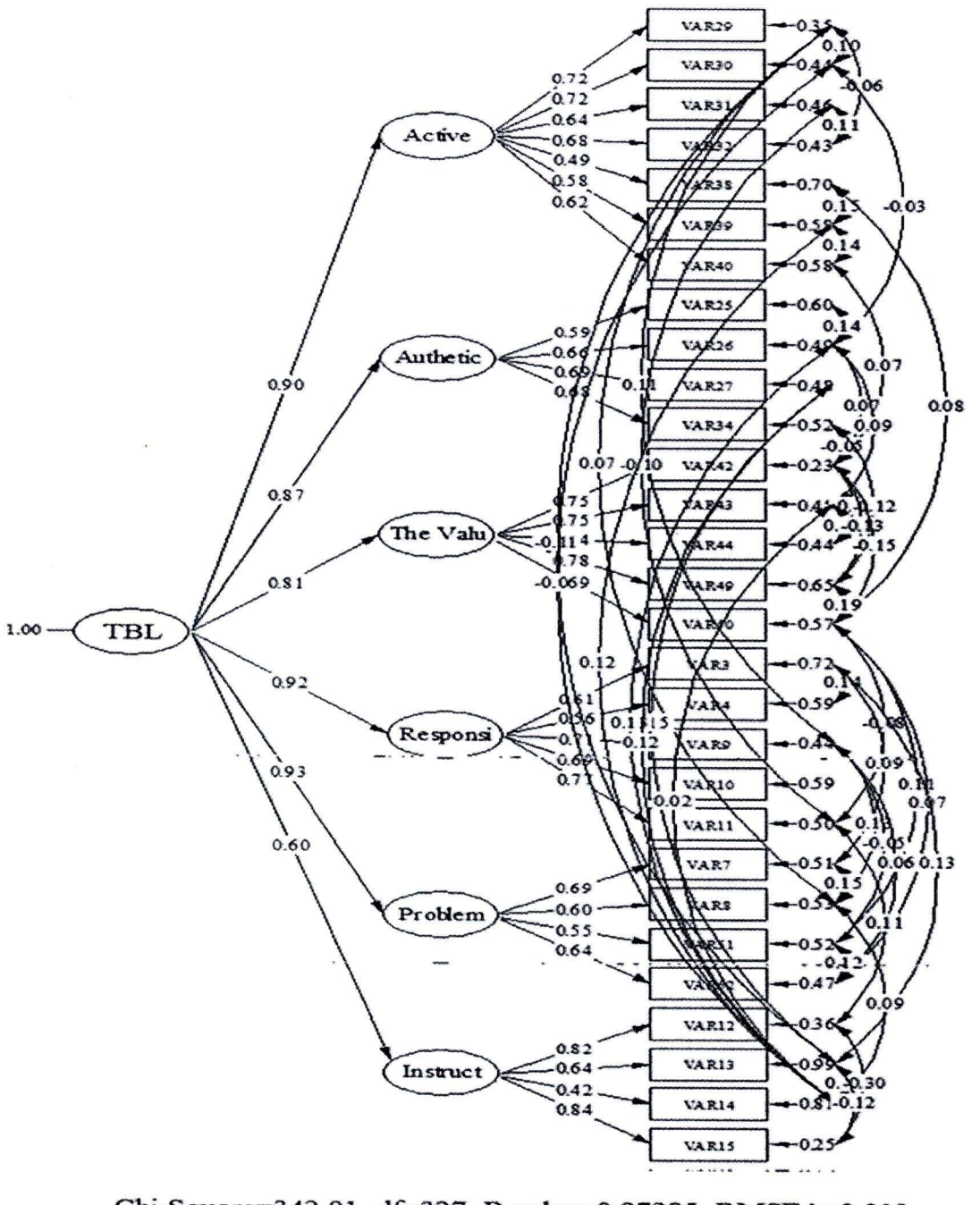

Figure 4.4 Second-order factor analysis of students' perceptions

Table 4.6 presents a model of measurement of second-order factor analysis of student perceptions which had high satisfactory validity and fit the empirical data. The statistical values were as follows: χ^2 non-significant, p = 0.27, RMSEA = 0.01, ECVI = 2.01, Model AIC = 558.01, NFI = 0.98, CFI = 1.00, SRMR = 0.04, GFI = 0.92 and AGFI = 0.90. Thus, the fit indices were good.

Table 4.6 Student second-order factor analysis: Goodness-of-fit indices and empirical data.

Fit indices	Standard	Value	Result	Summary
χ^2-Sig. (p)	>0.05	0.27	Pass	Good
RMSEA	<0.05	0.01	Pass	Good
ECVI	<ECVI for saturate model (3.13)	2.01	Pass	Good
Model AIC	<Saturated AIC (870)	558.01	Pass	Good
NFI	>0.90	0.98	Pass	Good
CFI	>0.90	1.00	Pass	Good
SRMR	<0.05	0.04	Pass	Good
GFI	>0.90	0.92	Pass	Good
AGFI	>0.90	0.90	Pass	Good

RMSEA = root mean square error of approximation; ECVI = expected cross-validation index; ModelAIC = model akaike's information criterion; NFI = normed fit index; CFI = comparative fit index; SRMR = standardized root mean square residual; GFI = goodness of fit index; AGFI = adjusted goodness of fit index.

Table 4.7 reveals that there were six factors as the result of factor analysis. However, using LISREL^{TM} analysis to confirm those six factors, it was found that only six factors of students' perceptions of TBL had good fit indices.

Table 4.7 Comparison of the results of factor analysis and LISREL^{TM} analysis of students' perceptions.

Factor	Factor Analysis	LISREL^{TM} Analysis
1. Problem Solving	0.52	0.93
2. Responsibility	0.52	0.92
3. Active Learning	0.68	0.90
4. Authentic Assessment	0.62	0.87
5. The Value of Team	0.79	0.81
6. Instructional Design	0.77	0.60

4.2.4 Objective 3: To compare the differences between instructors' and students' perceptions of the factors affecting TBL in universities in Thailand

Table 4.8 shows that there were significant differences among instructors and students on their perceptions of the importance of *The Value of Team* and *Instructional Design* in TBL, $t = -2.63$, $p < .01$ and $t = -3.82$, $p < .01$, respectively. Students were more likely than instructors to affirm *The Value of Team* as important. Instructors were more likely than students than to affirm *Instructional Design* as important.

Table 4.8 Comparison of the factors perceived as important between instructors and students from LISREL^{TM} analysis using a t-test

Factor	Status	N	*M*	*SD*	Mean Difference	*t*	*p*
Active Learning	Instructors	270	5.83	0.59	-0.11	-1.08	0.280
	Students	288	5.94	0.72			
The Value of Team	Instructors	270	5.78	0.68	-0.14	-2.63**	0.009
	Students	288	5.92	0.81			
Authentic Assessment	Instructors	270	5.81	0.68	0.06	1.45	0.146
	Students	288	5.75	0.77			
Instructional Design	Instructors	270	5.88	0.65	0.26	3.82**	0.000
	Students	288	5.62	0.79			

**p<0.01

Figure 4.5 presents a chart indicating that both instructors and students perceived *Active Learning* and an emphasis on *Authentic Assessment* as important factors affecting TBL. Compared to instructors, students were significantly more likely to value *The Value of Team* than *Instructional Design*. Thus, in TBL classrooms, instructors' perceptions of student learning achievement through TBL may focus less on *Instructional Design* than on *The Value of Team* or *Active Learning* or *Authentic Assessment*.

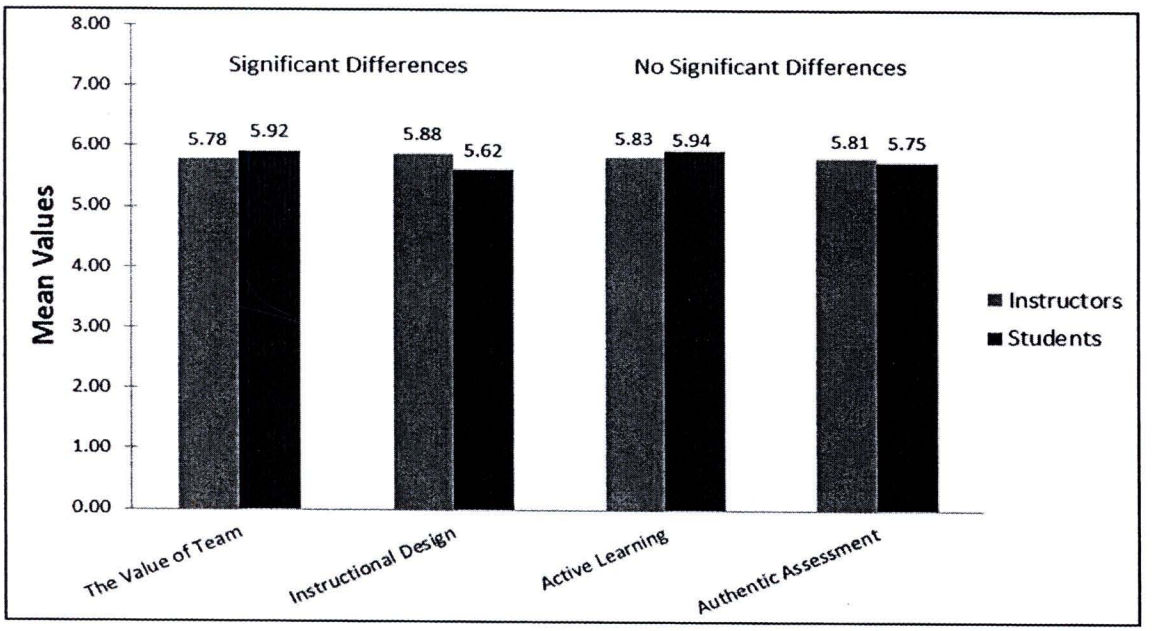

Figure 4.5 A chart of the mean values of factors perceived as important by instructors and students