Analyzing the Factors Influencing Students’ Evaluation of Teaching Quality in College English Classes through Partial Correlation Analysis

Liang-ping ZHANG\textsuperscript{1,a} and Xiang-xin LIU\textsuperscript{2,b}

\textsuperscript{1}School of Foreign Languages, Wuhan Polytechnic University, Wuhan, China
\textsuperscript{2}Department of Public Relations, Wuhan Railway Vocational Technological University, Wuhan, China

\textsuperscript{a}617657691@qq.com, \textsuperscript{b}631867801@qq.com

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\textbf{Abstract.} In order to explore whether the factors in College English classes influence the scores of students’ evaluating teaching quality, the authors studied the non-teaching factors and the teaching factors related to the teachers and statistically analyzed the evaluation results by the use of the SPSS software. It shows that the teaching factors are crucial to the evaluation result while the non-teaching factors have no correlation or very weak correlation on it, that is, teachers’ educational background and gender have no effect on the evaluation result, and teachers’ teaching experiences and professional titles have weak effects on the scores of the evaluation indirectly.

\textbf{Background}

It is known that teaching quality is the lifeline for the development of Higher Education Institutions, and as the most important form of teaching, classroom teaching is the foundation of the teaching quality. In order to assess the teaching quality of the teachers, a great diversity of methods have been used, such as expert evaluation, peer evaluation and student evaluation. Especially in recent years, the student evaluation has become an essential part in the university and remained dominant in the evaluation of classroom teaching quality to a great extent. After formulating a comprehensive set of evaluation index, the school authority organizes the students to assess the teachers online according to the evaluation index such as teachers’ teaching attitude, teaching methods and teaching effect. Subsequently, the results returns to the corresponding teachers, which is said to contribute to the improvement of teaching methods. Hence, students’ evaluation of teaching quality, as an effective means of teaching quality evaluation, plays an important and positive role in the teaching quality monitoring system. But at present there exist many disputes about its availability and significance \cite{1-4}, mainly because many teachers are worried that some non-teaching factors will affect the evaluation result, and then occurs unfairness. This paper tries to use the partial correlation analysis to analyze how the various factors in College English classes influence the evaluation results, and explore how to avoid this influence from some non-teaching factors on them, so as to improve the rationality and fairness of students’ evaluation of teaching quality.

\textbf{Research Methods}

In this paper, the data derived from student evaluation of College English classes of a university in 2015, and 116 raw data were randomly selected. These data included the evaluation scores and results from some non-teaching factors, such as teacher's gender, educational background, professional title and teaching experience, as well as some teaching factors, such as English teachers' basic skills, teaching attitude, teaching content, teaching methods, teaching effects and so on.

In the data analysis, dependent variable and independent variable are taken into account. The dependent variable involved in this paper is the result of teaching quality evaluation, and the
independent variables are the non-teaching factors which include teachers’ gender, educational
background, professional title and teaching experience, and the teaching factors which include
teachers’ basic skills, teaching attitude, teaching content, teaching methods and teaching effects. In
the process of data statistics by using the SPSS software, the method of partial correlation analysis
is used to analyze the influence of non-teaching factors and teaching factors on the evaluation
results. Due to that some of the non-teaching factors are character type which is not suitable for
statistical analysis, it is necessary to make the corresponding conversion of these characters, among
which the teachers’ teaching experience denoted in number needs no conversion. The male and the
female gender are respectively transformed into numbers 1 and 0. The teachers’ professional titles
are numerically transformed from high to low, that is, professor, associate professor, lecturer and
teaching assistant are transformed into 4, 3, 2, and 1. Similarly, the teachers’ educational
backgrounds such as doctor, master, bachelor and others are transformed into numbers 4, 3, 2,
and 1.

Partial Correlation Analysis

As we know, between dependent variable and independent variables, there exists a functional
relationship as well as a correlation, which indicates that these two variables are related to each
other in some way. The correlation is denoted by a correlation coefficient. The sign and the absolute
value of a correlation coefficient describe the direction and the degree of the relationship between
two variables, and the value of a correlation coefficient ranges between -1 and 1. A positive
correlation means that if one variable gets bigger, the other variable tends to get bigger. A negative
correlation means that if one variable gets bigger, the other variable tends to get smaller.
Furthermore, if the correlation coefficient is positive, it means the correlation between two variables
is positive; if the correlation coefficient is negative, it means the correlation between two variables
is negative.

For example, if \( x \) and \( y \) are two variables, the absolute value of the correlation coefficient of \( x \) and
\( y \) is equal to the absolute value of the correlation coefficient of \( y \) and \( x \), but the signs of them are
opposite. The bigger the absolute value of the correlation coefficient is, the greater the degree of
correlation between two variables is. In statistics, when the absolute value of correlation coefficient
is in the interval \([0, 0.3)\), it shows the variables are not correlated or very weakly correlated; when
the absolute value is in the interval \([0.3, 0.5)\), the variables have low or weak correlation; when the
absolute value is in the interval \([0.5, 0.8)\), the variables are significantly related; and when the
absolute value is in the interval \([0.8, 1]\), the variables are strongly correlated.

There are two common types of correlation analysis mainly for data analysis, that is, simple
correlation analysis and partial correlation analysis. Simple correlation analysis is usually used to
analyze the relationship between the two variables, and it is indicated by the correlation coefficient
\( r \) which reflects the close degree and direction of the relationship between the two variables. Partial
correlation analysis is a method used to describe the relationship between two variables while
taking away the effects of another variable, or several other variables, on this relationship. In reality,
the relationship between two variables is not only affected by themselves, but also affected by
something else. If we still use simple correlation analysis to describe this relationship, the effects
from other variables may be ignored. Therefore, in order to accurately analyze the degree of
correlation between two variables, we have to put partial correlation analysis into use. That is to say,
when analyzing the relationship between two variables, if we eliminate the effects from the third
variable on them, we may find the unique variance between the two variables. [5, 6]

Simple correlation coefficient usually uses Pearson correlation coefficient computation formula
below:

\[
 r = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2 \sum_{i=1}^{n}(y_i - \bar{y})^2}}
\]  

(1)
In this formula, \( r \) denotes the simple correlation coefficient for variables \( x \) and \( y \), \( n \) is the number of samples for observation, \( \bar{x} \) and \( \bar{y} \) are the values taken in \( i \)th sample for two variables \( x \) and \( y \), and \( \bar{x} \) and \( \bar{y} \) are the sample means of \( x \) and \( y \).

Because of the existence of multiple variables, the simple correlation coefficient can not truly reflect the degree of correlation between the two variables. But partial correlation analysis can effectively reveal the true relationship between the two variables. The computation formula for the first-order partial correlation coefficient while controlling certain variable, is as follows (to eliminate the effects of another variable \( z \)):

\[
 r_{x,y,z} = \frac{r_{x,y} - r_{x,z}r_{y,z}}{\sqrt{(1-r_{x,z}^2)(1-r_{y,z}^2)}}
\]  

In this formula, \( z \) is a control variable, \( r_{x,y} \) denotes the simple correlation coefficient between variable \( x \) and variable \( y \), \( r_{x,z} \) denotes the simple correlation coefficient between variable \( x \) and variable \( z \), and \( r_{y,z} \) denotes the simple correlation coefficient between variable \( y \) and variable \( z \). Likewise, we can calculate the partial correlation coefficient while eliminating the effects of multiple variables.

The Results of the Study

Firstly, we collect and organize the data of the result of students’ evaluation of teaching quality as well as the teaching and non-teaching factors in College English classes. These factors include teachers’ gender, educational background, professional title, teaching experience, teachers’ basic skills, teaching attitude, teaching contents, teaching methods, and teaching effect.

Secondly, by using the SPSS software, we statistically analyze the simple correlation between the teaching and non-teaching factors and the result of assessment. The simple correlation coefficient between them is shown in Table 1.

<table>
<thead>
<tr>
<th></th>
<th>G</th>
<th>EB</th>
<th>PT</th>
<th>TE</th>
<th>BS</th>
<th>TA</th>
<th>TC</th>
<th>TM</th>
<th>Te</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA</td>
<td>0.238</td>
<td>0.366</td>
<td>0.596</td>
<td>0.567</td>
<td>0.923</td>
<td>0.911</td>
<td>0.907</td>
<td>0.931</td>
<td>0.957</td>
</tr>
</tbody>
</table>

Note: G=gender, EB=educational background, PT=professional title, TE=teaching experience, BS=basic skills, TA=teaching attitude, TC=teaching contents, TM=teaching methods, Te=teaching effect, RA=results of teaching quality evaluation

Table 1 analyzes the simple correlation coefficient between the 9 variables and the evaluation result, and from this analysis, it can be seen that the non-teaching factors have little effect on the evaluation result, but the teaching factors have greater impact on it. In the non-teaching factors, the correlation coefficients between the professional title and the teaching experience and the evaluation result are relatively bigger. In the simple correlation analysis, the correlation between each independent variable and the dependent variable (the evaluation result) is affected by the other 8 variables, therefore, Table 1 can not effectively explain the correlation degree between each variable and the evaluation result.

Finally, we analyze the partial correlation between the teaching and non-teaching factors and the result of assessment. Table 2 is the correlation coefficient obtained by the use of the partial correlation analysis. In the partial correlation analysis, the correlation coefficients between each variable and the evaluation result have been got under the control of the other eight independent variables. Take one calculation as an example, when calculating the partial correlation coefficients between gender and evaluation result, at the very beginning, we take away the effects from educational background, professional title, teaching experience, teachers’ basic skills, teaching
attitude, teaching methods and teaching effect. Thus the partial correlation analysis can accurately analyze the correlation degree between each variable to some degree.

Table 2. The partial correlation coefficient between non-teaching and teaching factors and the result of teaching quality evaluation.

<table>
<thead>
<tr>
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<th>TE</th>
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<th>TA</th>
<th>TC</th>
<th>TM</th>
<th>Te</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA</td>
<td>0.001</td>
<td>0.039</td>
<td>0.027</td>
<td>0.977</td>
<td>0.962</td>
<td>0.968</td>
<td>0.971</td>
<td>0.986</td>
<td></td>
</tr>
</tbody>
</table>

Note: G=gender, EB=educational background, PT=professional title, TE=teaching experience, BS=basic skills, TA=teaching attitude, TC=teaching contents, TM=teaching methods, Te=teaching effect, RA=result of teaching quality evaluation

Analysis and Discussion

On the one hand, from the partial correlation analysis of Table 2, we can find that there exists no correlation between the non-teaching factors and the evaluation results. Of these four factors, the correlation coefficients between professional title and teaching experience and the evaluation result are slightly bigger, respectively 0.039 and 0.027. But the correlation coefficient between gender and educational background and the evaluation result are close to zero. It is generally believed that the higher the education degree is, the higher the score of the teaching quality evaluation should be, which is due to a higher educational background owns more domain knowledge, but this study result is not the case. This may mean that the highly educated do not necessarily have experience in teaching. Teachers' professional title and teaching experience have higher degree of correlation than the educational background, which may just illustrate that those with higher professional titles and longer and richer teaching experience are easily affirmed and praised by the students.

On the other hand, from Table 2, we may find that the teaching factors determine the result of students’ evaluation of teaching quality, and are closely related to the evaluation result. What factors the students value most are teaching effect, teachers’ basic skills, teaching methods, teaching content and teaching attitude.

Conclusion

This paper analyzes the partial correlation between the non-teaching factors and teaching factors in College English classes and the results of students’ evaluation of teaching quality. We can find that there exists no correlation between the non-teaching factors and students’ evaluation result, except that a few factors such as professional title and teaching experience have very weak effects on the evaluation result, which may be due partly to that these two factors are related to teachers’ teaching experiences, indirectly related to the quality of teaching. Teaching factors are the determinants in students' evaluation of teaching quality. From the partial correlation analysis, we can see that College English teachers cannot receive recognition and affirmation from the students until they improve their teaching levels.

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References


