Extrinsic Motivation and its Association with the Teaching Quality, Student Attitude and Academic Performance in Engineering Students

Waldyr Fong Silva¹, Jesús A. Cuases Arrieta² and Cristian Y. Quintero Castañeda³

¹ University of Cartagena, GIMIFEC Research Group, Cartagena, Colombia
²,³ University Cooperativa of Colombia ISI Research Group
Santa Marta, Colombia

Abstract

The association between extrinsic motivation, teaching quality, student attitude and academic performance was analyzed in 950 students of the engineering programs of the University of Cartagena between 2014 and 2016. The instrument to measure extrinsic motivation was evaluated through the CEVEAPEU questionnaire (questionnaire for the evaluation of learning strategies of university students) developed and validated by Gargallo et. al (2009) which was modified for the research requirements and validated by Alfa de Cronbach. The teaching quality and academic performance were evaluated by means of a survey, while the student attitude was evaluated by means of the instrument designed by Lindner et al (1993) called "Inventory of Self-regulation of Learning" incorporating elements of Boza & de la O Toscano (2012). For the relationship analysis, the variables were crossed and the bar diagrams and the 2x2 contingency tables were constructed applying the Chi-Square independence test. The values of 0.91, 0.85, 0.89 and 0.88 for the Cronbach's Alpha allowed to validate the instruments used. The results indicate that there is a significant degree of statistical significance (p <0.05) between extrinsic motivation and teaching quality (p = 0.0002) and student attitude (p = 0.0000) at a confidence level of 95%. This means that extrinsic motivation and teaching quality are associated statistically due to the pedagogical quality and quality teacher training of the professors of the faculty of engineering. On the other hand, the positive
attitude that engineering students have, it has allowed the establishment of a statistical association between extrinsic motivation and student attitude.

**Keywords:** Extrinsic motivation, teaching quality, student attitude, academic performance

**Introduction**

According to Lepper (1998), extrinsically oriented students have a tendency to work with minimal effort, problems related to the context. That is to say, they expect to achieve high recognitions assuming challenges with low levels of difficulty [1]. Lucas and Ogilvie (2006) consider that there is a positive relationship between the transmission of knowledge and extrinsic motivation, however, the results of their study do not support the association or influence between these variables [2].

Mc Alpine and Weston (2000) cit. in Kane et al. (2002) consider that professor conception of teaching-learning processes must be modified in order to achieve the required changes in higher education and those necessary in their quality processes [3, 4]. Likewise Schoenfeld (1998), considers that a professor must present their work material in a comprehensible way to students following the pedagogical guidelines established by the institution in order to allow the student to achieve their academic achievements [5]. For Díaz et. al (2002) one of the fundamental indicators in the issue of the quality of higher education is the academic performance of the student since it allows to make an approximation to the university educational reality [6]. For Pérez et. al (2000) and Vélez-Roa (2005), academic performance is defined by a value attributed to student achievement in their academic activities. These achievements are weighted quantitatively by the grades obtained in the different subjects where the results show the level of academic success, number of subjects won and losses where it can be identified that this academic performance is made up of the association of various factors that affect the person who learns [7, 8].

For Amat (1998) the positive attitude of a professor must be characterized by: (1) know the common interest of the student body (2) possess positive expectations about the academic level of the students(3) Recognize the influence exercised by the professor on his students. In this way, the academic process will be successful to the extent that the professor's attitude towards his students is positive [9]. For Sales et. al (2001), the attitude of teaching staff regarding the expectations they have of those students with special educational needs, it represents one of the most influential factors in academic processes. Further, positively or negatively affects the processes of motivation, learning and self-esteem of them [10].

In the present investigation the association between the extrinsic motivation of the university students with the teaching quality, academic performance and student attitude was evaluated.
Materials and Methods: Population and sample size: The study participants were regular students of the fourth semester of the programs of Civil Engineering, Systems, Chemistry and Food of the University of Cartagena. Of the total, 75% were male and 25% female. The ages of the students were between 17 and 21 years old. To estimate the size of the sample when it comes to a finite population of less than 100,000 individuals is calculated according to Fong et al. (2017) [11] by equation (1):

\[ n = \frac{\sigma^2 Npq}{e^2 (N - 1) + \sigma^2 pq} \]  

(1)

n: Number of elements that the sample must have; p: Probability that an element is selected (% estimated); q: Probability that an element is not selected (q = p); \( \sigma \): Level of confidence or risk chosen; e: Error allowed; N: Number of population elements.

Variables, phases, instruments and reliability of the test: The variables used in the research were classified into two (2) categories (independent and dependent): 

a. Independent variables: Teaching quality, academic performance and student attitude.

b. Dependent variable: Extrinsic motivation

The research was carried out in three (3) phases: In the first one, the degree of extrinsic motivation of engineering students was identified by means of a survey. In the second phase, the teaching quality, academic performance and student attitude were measured. In phase 3 the independent variables are crossed with the dependent variable extrinsic motivation constructing the bar diagram of the relational analysis.

Instruments

The extrinsic motivation was evaluated through the CEVEAPEU questionnaire (questionnaire for the evaluation of learning strategies of university students) elaborated and validated by Gargallo et. al (2009) [12]. Teacher quality was evaluated through a survey. Academic performance was evaluated through a survey taking into account the following dimensions: conceptual performance (conceptual content), procedural performance or of procedure (ability to execute and solve problems) and global performance (Qualification obtained in the subject and that arises from integrating the conceptual and procedural performance). The student attitude was evaluated through the instrument designed by Lindner et al (1993) [13] called "Inventory of Self-Regulation of Learning" incorporating elements of Boza & De la O Toscano (2012) [14]. To determine the reliability of the test the internal consistency was determined using the Cronbach Alpha [15].
The dependent variable, extrinsic motivation, was classified into two categories: a) Low extrinsic motivation (LEM) (LEM <75 points or less) and b) High extrinsic motivation (HEM) (HEM ≥ 75 points out of 100 points). The independent variables were classified into three categories: a) Low teaching quality (LTQ) (score below 20, LTQ <20 points) and high teaching quality (HTQ) (score equal to or greater than 20 points out of a total of 30; HTQ ≥ 20). b) Academic performance: Low academic performance LAP (LAP <75 points or less) and high academic performance (HAP) (HAP ≥ 75 points out of 100 points). c) Student attitude: Low student attitude (LSA) (LSA <171 points or less) and high student attitude (HSA) (HSA ≥ 171 points out of 300 points).

Statistics analysis: The Chi-Square statistical test [16] between the extrinsic motivation and the independent variables: teaching quality, academic performance and student attitude was used to know which of these factors are related to each other in the engineering students of the University of Cartagena.

Results and Discussion: According to equation 1, with a confidence level of 95%, a sample size of 274 individuals is obtained. When applying the surveys, a total of 12 students per academic period and per program (4 programs, 6 academic periods) were made homogeneously for a total of 288 respondents.

The Cronbach’s Alpha [15] for the CEVEAPEU instruments (questionnaire for the evaluation of learning strategies of university students), teaching quality, academic performance and student attitude with elements of Boza & de la O Toscano (2012) yielded the values of 0.91, 0.85, 0.89 and 0.88 respectively. This indicates a high degree of internal consistency of each of the tests. The Chi-square test was evaluated for the analysis of the relationship between the dependent variable (extrinsic motivation) and the independent variables (teaching quality, academic performance and student attitude).

Table 1 additionally indicates the values of p (statistical significance), which also shows that there is a relationship of high statistical significance between the extrinsic motivation and the teaching quality and student attitude (p < 0.05).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi-square</th>
<th>GL</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher quality</td>
<td>14.06</td>
<td>1</td>
<td>0.0002</td>
</tr>
<tr>
<td>Academic performance</td>
<td>0.71</td>
<td>1</td>
<td>0.4008</td>
</tr>
<tr>
<td>Student attitude</td>
<td>21.72</td>
<td>1</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

** Relationship with high statistical significance at a confidence level of 95%
Figure 1 shows the bar graph between extrinsic motivation and teaching quality.

The 39.4% (85 cases) of the students developed a high extrinsic motivation as a result of a high quality teaching. This allows to corroborate the statistical significance between the two variables. In addition, this relationship is due to the high pedagogical qualities that the professor of the faculty of engineering possesses and above all because it identifies the common interest of the student body and is able to adapt to the specific needs of each student according to the approaches of Amat (1998)[9]. In the same way, the attitude of the teaching staff has a significant impact on extrinsic motivation, since it can generate a desire in the student to generate innovation processes during his / her academic activity as it is proposed by Sales et. al (2001) [10]. The 19.4% (42 cases) of the students developed a low extrinsic motivation as a result of low teaching quality. This means that this group of the studied population is affected according to the teaching quality. That is, the professor's low teaching quality, also affects self-esteem, attitude and learning processes as it is proposed by Sales et. al (2001) [10]. Additionally, it was possible to verify the approaches of Amat (1998) [9] since depending on the attitude of the professor towards his students, this way it will be the attitude that the student develops in his learning processes. 6% (13 cases) of students developed high extrinsic motivation as a result of low teacher quality. In this population one could understand this situation related to various factors that affect the person who learns according to what was proposed by Vélez-Roa (2005) [8]. Likewise, these students privilege more the achievement and academic goals than the quality of the professor. That is, they could be understood as more autonomous and independent students when developing their learning processes.

The 35.2% (76 cases) of the students had low extrinsic motivation as a result of a high quality teaching. This is probably due to the fact that some of the professors of the students participating in the study are researchers and it is very likely that they concentrate more on completing the class than in motivating his students. This confirms the postulates of Mc Alpine and Weston (2000) cit. In Kane et. al (2002) [3, 4].
Figure 2 shows the bar graph between extrinsic motivation and student attitude.

![Extrinsic Motivation-Student Attitude](image)

**Figure 2. Bar graph extrinsic motivation-student attitude.**

38.9% (84 cases) of the students developed a high student attitude as a result of high extrinsic motivation. This is because the motivational processes implemented by the professor in the classroom have a direct impact on the student, causing in him a great disposition towards the processes of learning in the classroom as proposed by Lucas and Ogilvie (2006) [2]. 3.7% (8 cases) of the students developed a low student attitude as a result of high extrinsic motivation processes. It is probable that in this studied population, the professor presents the work material in a comprehensible and attractive way according to the institutional parameters but it needs to involve the student even more by means of activities that allow him to put into practice the knowledge acquired in class so that they achieve their academic goals in an effective way, according to Schoenfeld (1998) [5]. 20.8% (45 cases) of the students developed a low student attitude as a result of low processes of extrinsic motivation. This allows to verify the statistical significance between these variables. In the same way, this allows to continually re-evaluate the teaching-learning process that is adopted since this process must allow more than to diminish the student's attitude, increase it through extrinsic motivation strategies as a result of specialized workshops, forums with experts, professor-student conversations, simulation of cases-problems among other strategies. In addition, it is very likely that this group of students have a tendency to work with minimal effort as Lepper (1998) suggests [1]. 36.6% (79 cases) of the students developed a high student attitude as a result of low processes of extrinsic motivation.

This studied population was characterized for being students whose student attitude is more dependent on the value attributed to the achievement of course approval than due to motivational aspects.

**Conclusion:** Based on the analysis as above, it is concluded as follow: There is statistical significance at a 95% level of confidence between the extrinsic motivation and the quality of the engineering professor at the University of Cartagena. This is due
Extrinsic motivation and its association to the pedagogical quality and the professor training that drives the administration of the different programs of the faculty semester to semester. It was possible to verify statistical significance between extrinsic motivation and student attitude at a 95% level of confidence. This is the result of the positive attitude assumed by the professors of the faculty with their students. In addition, they use learning processes where they involve the common interest of the students and expectations about the academic achievements of the course, having a decisive influence on their self-esteem. No statistical significance could be verified at a 95% level of confidence between extrinsic motivation and academic performance in the engineering students of the University of Cartagena.

References


Received: September 3, 2018; Published: December 14, 2018