Association between Demographic Factors, Motivation and Self-Regulation of Learning from a Vygotskian Perspective in Engineering Students

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Abstract

We analyzed the association between motivation, demographic factors (age, gender) and self-regulation of learning from the Vygotsky theory in 950 students of the engineering programs of the University of the Guajira between 2014 and 2016. The instrument for collecting the information was the Self-Regulation Inventory for Learning (SRLI) designed by Lindner, Harris and Gordon (1993) which was modified for the requirements of the research and validated by Cronbach's Alpha. For the relationship analysis, the variables were crossed and the bar diagrams and the 2x2 contingency tables were constructed by applying the Chi-Square independence test, which showed the degree of statistical significance among the variables. The value of 0.87 for the Cronbach's Alpha allowed to validate the instrument used. The results indicate (p = 0.0006) that there is an important degree of statistical significance between motivation and self-regulation of learning from Vygotsky's theory with a 95% confidence level. This allowed to identify that the motivation plays an important paper in the students of Engineering of the University of the Guajira, since when this one increases or to diminish, it will change in the same proportion the Autorregulación of the learning if she is weighted from Vigotsky's perspective.

Keywords: Self-regulation of learning from the perspective of vigotsky, motivation, age, gender
Introduction

The self-regulation of learning from the Vygotskian perspective starts with the student's desire to enhance their interpersonal relationships, their self-control, healthy coexistence, and to dominate or control the environment in which they operate. For this, private speech, awareness, internalization of sociocultural norms, social mediation and the zone of proximal development are key elements to acquire this skill [1, 2].

Private speech is conceived as a medium that allows students to internalize and make sense of the information they receive from their teachers, telling those words to themselves in order to self-regulate their behavior processes. The take of awareness begins when the individual internalizes the meaning of the words that the teacher or tutor is directing during their formative process [3, 4, 5, 6]. The internalization of sociocultural norms allows the student to create his own identity. Social mediation is achieved through the interaction of students with their professor tutors (area of proximal development) which are the bridge that allow to shorten the distance between what the student can’t do on their own but can do with the professor and companions [6].

All of the above, for Vygotskian theorists like McCaslin and Hickey (2001b, 2001a) [4, 6] is combined in a coregulation model in which motivation is a key part of the process, since it is the result of the internalization of the norms sociocultural that allow the student to create their own identity that will help them to establish goals and objectives product of the interactions with the context in which it develops and that force it to be competent. In other words, the take of student's awareness will control their behavior allowing them to organize, plan, orient themselves towards medium and long-term goals. Likewise, they will cause the student to develop: skills, cognitive, metacognitive and motivational strategies that will allow them to self-regulate during their learning process. That is, the environment, private speech, social agents (teachers) and zone of proximal development are the fundamental conditions for the self-regulatory process according to this theory [4]. According to Montes and Lerner (2011) [7], low academic performance is often related to age, since students do not have clarity about their professional profile, interests, attitudes and aptitudes. In the same way Gómez et. al (2017) [8] considers that the student's age defines, to some extent, the continuous and progressive development of memory, that is, it is associated with the chronological age of the individual.

Other authors such as Fong et al. (2017) [9] demonstrated that there is no statistically significant association at a 95% confidence level between the cognitive processes (knowledge) developed by the student and their chronological age. That is to say, qualities own characteristic of adults such as analysis, interpretation, reflection, feedback and abstraction are not differentiators or determinants with the dynamic processes that students use in the learning styles of their academic exercise.

Authors such as Rodríguez et al. (2004) [10] consider that women have a slight tendency to be a better student than the male student, that is, it can’t be said that
there is a direct relationship between academic performance and gender. Likewise, studies such as Lynn's (1994, 1998, 1999) [11, 12, 13], were able to show that academic performance in adult males is higher than that of adult women in four points and that this is due to mainly because intelligence in males exceeds that of women. In this same sense, Ankeney (1992, 1995) [14, 15], in his post-mortem study (N = 1261), found that men's brain mass is on average 100 grams greater than that of women. With this he was able to verify that the intelligence of man exceeds that of women since, according to Haug (1987) [16], cognitive ability is associated with brain mass.

Abarca (1995) [17] considers that conditioning elements of the environment affect students on the importance of studying or not, since the economic situation in which they live also forces them to earn a living. This situation generates in students questions related to the raison d'etre of studying, whether it is really worthwhile or not and about why they should do it. That is, the student to some extent, is influenced by social, economic, political, cultural and environmental situations and circumstances among others. Pintrich and Schunk (2006) [18] consider that motivation is an intrinsic process that keeps alive the desire to reach a goal. That is, it is a continuous and changing process that involves physical as well as mental activity and whose ultimate goal is the satisfaction of achieving an achievement, goal or objective. In the same way, motivated learning according Pintrich and Groot (1990) [19], requires the student to acquire skills, skills and strategies that allow him to reach academic goals in a short time in an effective way and that involves the achievement of partial goals throughout all their academic exercise before reaching the final goal.

In this research, the relationship between motivation, demographic factors and Self-regulation of learning from the Vygotskian theory in university students was evaluated through the instrument designed by Lindner et al (1993) [20], called inventory of self-regulation of learning which was adjusted according to the requirements of the investigation.

### Materials and Methods

**Statistical method:** The statistical method used in the present investigation was the inferential statistic for populations under 100000 individuals. **Population and sample size:** The study participants were regular students of the fourth semester of the programs of Civil Engineering, Systems, Industry and Environmental of the University of the Guajira. Of the total, 70% were male and 30% female. The ages of the students were between 17 and 22 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) [9] by equation (1):

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

(1)
n: Number of elements that the sample must have; \( \sigma \): Level of confidence or risk chosen; \( p \): Probability that an element is selected (% estimated); \( q \): Probability that an element is not selected (where \( q = p \)); \( e \): Error allowed; \( N \): Number of population elements.

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


c. Dependent variable: self-regulation of learning from the Vygotskian theory.

Self-regulation of Learning was assessed using the SRLI (Self-Regulation of Learning Inventory) which is a questionnaire designed by Lindner et al. (1993) [20] consisting of 80 weighted questions from 1 to 5 based on the Likert scale. This questionnaire was modified according to the research requirements. The research was carried out in three (3) phases: In the first one, were identified the demographic factors, that associated with motivation and self-regulation of learning from the theory of Vygotsky, among many others, could influence the learning processes in the engineering students. In the second phase, the instrument formed by the self-regulation of modified learning from the theory of Vygotsky, was applied to the student population under study. In phase three, the independent variables age and gender were crossed with the dependent variable (self-regulation of modified learning since Vygotsky theory) elaborating the bar diagrams and contingency tables of the relationship analysis. The instrument was validated as reported by Reinhard and Bruce (1993) [21]. To determine the reliability of the test the internal consistency was determined using the Cronbach Alpha [22].

The dependent variable self-regulation of modified learning, from the theory of Vygotsky was classified into two categories: The Self-Regulation of learning Level was organized into two categories: SRPVL: Low self-regulation (scores below 300 points (SRPVL <300)) and SRPVH: High self-regulation (scores equal or greater than 300 (SRPVH \( \geq 300 \)). The motivation was classified as follows: Low motivation (LM) (LM \( <75 \) points or less) and high motivation (HM\( \geq 75 \) points or more, out of a total of 100 points). The independent variables were classified into two categories: a) Age: without majority of age: SM (age \( <18 \) years) and with majority of age: CM (age \( \geq 18 \) years). b) Gender: male (M) and female (F).

**Statistic analysis:** The Chi-Square test [23] was evaluated for the analysis of the relationship between self-regulation of learning from Vygotsky's perspective and the independent variables (age, gender and motivation). Likewise, it was evaluated between motivation, age and gender.

**Results and Discussion:** By applying equation 1 with a 95% risk level to the total population size of 950 students, a sample size of 201 individuals is obtained. Taking this result into account, surveys were applied homogeneously on 9 students per academic period and per program (four programs, six academic periods) for a total of 216 respondents.
Cronbach's Alpha [22] showed an average value of 0.87 indicating a high degree of internal consistency of the test. Table 1 shows the values of p (statistical significance) and Chi-square, where it is observed that there is a relationship of high statistical significance between self-regulation of learning from Vygotsky's perspective and students' motivation (p <0.05).

The statistical significance between motivation and self-regulation of learning from the perspective of Vygotsky allows us to infer that the engineering student at the University of the Guajira is a student in which positive conditioning elements affect him. That is to say, when being motivated considers that it is worth studying engineering, being able to check the postulates of Abarca (1995) [17]. They also allow us to infer the assertions of Pintrich and Schunk (2006) [18] since students use dynamic and continuous processes that allow them to acquire intrinsic and motivated behaviors oriented towards the goal through cognitive, internalized and pragmatic processes. This has caused the engineering student to develop skills and abilities that have allowed him to achieve the proposed objectives so far. Likewise, the results indicate that the student of engineering at the University of the Guajira is a student who strengthens their interpersonal relationships, is self-controlled, has healthy coexistence and dominates aspects related to the context in which he operates. In addition, he is a student who uses private speech in his cognitive processes, is aware of the academic exercise he performs and internalizes the sociocultural norms that allow him through social mediation with teachers and classmates, minimize zone of proximal development proposed by Vygotsky [1, 2]. In addition, the internalization of its academic exercise mediated by the interaction with teachers and students has made the engineering student of the University of the Guajira create its own self-regulatory identity by shortening the distance in the zone of proximal development, that is, these students do many more things on their own that with the help of teachers and classmates (freelancers) [3, 5].

In the same way, the results allowed to verify that engineering students of the University of the Guajira employ a coregulation model that gives them identity as proposed by McCaslin and Hickey [4] in where motivation is a fundamental part of the process and competition, is a consequence of self-regulation and of the conditions established in the approaches of McCaslin and Hickey [6]. Finally, the association between the self-regulation of learning from Vygotsky's theory and motivation made it possible to verify that engineering students reflect on their own learning process and are able to contextualize the knowledge acquired according to Vygotsky's zone of proximal development [1, 2].

On the other hand, the results show that there is no relationship of statistical significance between the self-regulation of learning from a Vygotskyan perspective, age and gender, as well neither as between motivation, age and gender (p> 0.05). In the first case, the statements of Montes and Lerner [7] could not be verified since the engineering student of the University of the Guajira is a self-regulated student from the Vygotsky theory who has relatively good academic performance and also has clarity about their attitudes, professional interests and abilities. Neither couldn’t
Gómez's et. al [8] statements be verified since it was not possible to verify that the more mature or older student was more self-regulated from the theory of Vygotsky. In the same way it was possible to verify Fong's et. al [9] affirmations since the results indicate that the older student is not necessarily the most self-regulated from the perspective of Vygotsky nor the one that develops better cognitive processes. The results also did not allow to verify the postulates of Rodríguez et. al (2004) [10], Lynn (1994, 1998, 1999) [11,12,13], Ankney (1992, 1995) [14,15] and Haug (1987) [16]. That is, it could not be verified in this investigation if the male student is more self-regulated than the female student or vice versa since the results showed no association.

Table 1 Chi-Square Test for Self-Regulation and Motivation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi Square</th>
<th>GL</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.0</td>
<td>1</td>
<td>0.9567</td>
</tr>
<tr>
<td>Gender</td>
<td>0.150</td>
<td>1</td>
<td>0.6985</td>
</tr>
<tr>
<td>Motivation</td>
<td>11.72</td>
<td>1</td>
<td>0.0006**</td>
</tr>
<tr>
<td></td>
<td>10.58</td>
<td>1</td>
<td>0.0011**</td>
</tr>
</tbody>
</table>

**Relationship with high statistical significance at a confidence level of 95%

Figure 1 shows the bar graph between self-regulation of learning from Vygotsky's theory and student motivation.

Figure 1. Bar chart Self-regulation of learning from Vygotsky's perspective - Student motivation.

According to Figure 1, it is very rare that students with high self-regulation processes, evaluated from the perspective of Vygotsky (SRPVLH) have low motivation (LM), as indicated in figure 1. Only 3.2% (7 cases) of the students in
the sample showed this tendency, that is, despite the fact that some family, social or other aspect affects their disposition toward learning, they go ahead with their academic exercise despite that one of these conditioning factors is having a significant impact on their motivation and self-regulation for learning. That is, in these seven (7) cases it is probable that some of the postulates of Abarca (1995) [17] will be fulfilled, where the student may have to go out to earn a living or another activity, that does not allow him to advance to 100% your academic exercise. The 45.4% represented in 98 cases have a high motivation (HM) and low self-regulation from the Vigotsky perspective (SRPVL), that is, almost half of the sample is in this situation. This may be due to the fact that in this population there was low self-control, little private speech, low awareness, low internalization of socio-cultural processes and of social mediation. The 18.5% represented in 40 cases (the fifth part) has both the motivation and the self-regulation of learning evaluated from the Vygotsky theory, high (HM and SRPVH). This may be due to the fact that in this population it was possible to identify that students use mediation with teachers and students in their learning process as well as private speech and the internalization of concepts which has allowed them to do more things on their own than with the help of the Professor, that is, they have developed academic autonomy. In addition, they have created their own self-regulatory identity and are aware of their academic exercise. Finally, 32.9% of the sample represented in 71 cases (third part) have both the motivation and self-regulation of learning from the Vygotsky theory, low (LM and SRPVL). That is to say, in this group of students it was possible to verify that not all has become aware of their academic process. In addition, they control very few aspects of organization, planning and orientation towards the goal. This has generated few cognitive and metacognitive skills that affect the relationships of social coexistence, causing much more dependence on the Professor to carry out their academic activities. That is, this population has many weaknesses to shorten the zone of proximal development defined by Vygotsky.

Conclusion

Based on the analysis as above, it is concluded as follow: 1. There is statistical significance with a 95% level of confidence, between the self-regulation of learning from the theory of Vigotsky and the motivation of the engineering student at the University of the Guajira. That is to say, this student has created his own self-regulatory identity (evaluated from the perspective of Vygotsky) which is associated with the motivational processes stemming from his social interaction with professors and students (social mediation). In addition, it co-regulated using elements such as private speech, internalization, awareness and the zone of proximal development to establish goals in the short, medium and long term. This association allows us to conclude that the characteristics of a high motivation are articulated with high processes of self-regulation evaluated from the perspective of Vygotsky. In the same way, for low motivational processes, we should expect that the students lack the elements own of the self-regulation of learning evaluated from Vygotsky's theory. 2. There is no statistically significant relationship between
self-regulation of learning since Vygotsky's theory with age and gender at 95% confidence level. Neither there is statistically significant relationship at a level of confidence of 95% between motivation, age and gender in the engineering students of the University of the Guajira. This means that the self-regulation of learning from Vygotsky's theory does not depend on the maturity or gender of the student. Nor can it be said that men are more self-regulated than women or that women are more self-regulated than men from the Vygotskian theory.

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