

## SELF-EFFICACY IN HIGH-SCHOOL STUDENTS

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### *Abstract*

*National and international evaluation programs have reported that many high-school students achieve low performance. Because of the former, this research seeks to determine the study strategies used by high-school students enrolled in a private institution. The present study is quantitative in nature, non-experimental and utilized a cross-sectional design; the sample was non-probabilistic and composed by 353 students from a private school in the city of Rioverde, San Luis Potosí who attend the first and second year of high-school, being 46.7% men and 53.3% women between the ages of 15 and 18 years old. The theoretical model proposed by Pérez and Delgado (2006) was used and the results show that in this context there are only four significant variables: spend more hours studying, make a list of the topics to develop, ask in class when they do not understand the explanation of the professor and attend classes even if they have some concern, this affective traits are consequential for self-efficacy.*

Keywords: self-efficacy; PISA program; students Math performance

### **Introduction**

The Program for International Student Assessment and the Secretariat of Public education have reported that many high-school students have low performance levels in the subjects of Mathematics, Sciences and Reading.

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With regard to Mathematics, the mean score obtained by the countries of the Organization for Economic Co-Operation and Development (OECD) was 494 points whereas Mexico scored 413 points. On a national scale, the Secretary of Public Education reported through the PLAMEA test that 43.3% of students are at level I, 20.7% at level II, 23.8% at level III and 12.2% at level IV.

On the state of San Luis Potosí, 42.9% of students are at level I, 21.5% at level II, 24.1% at level III and only 11.5% at level IV. At the studied school, 9.3% are at level I, 30.8% at level II, 34.1% at level III and 25.8% at level IV.

In the subject of Sciences, PISA (2012) reports that Mexican students achieved a mean score of 415, 165 points below the highest ranking mean score of 580, which corresponds to Shanghai-China. Also, 2% of students are in the high levels, 51% of students are in the middle levels (2 and 3) and 47% are at level 1 or below.

These low parameters show a lack of competence in those subjects among students, a situation that is concerning due to the impact of those topics by means of their application in different scientific areas and daily-life matters. Therefore, it is possible to observe the importance of knowing the reasons affecting the progress in these areas. Some of the causes considered by authors Laukenmann, Bleicher, Alboroto, Glaser-Zikuda, Mayring, and von Rhöneck, (2003) are the cognitive, affective and social factors, which have an impact in the learning of concepts related to Sciences. There are also several important studies that highlight the beliefs of self-efficacy, motivation, learning, performance, stress and anxiety (Pintrich & De Groot, 1990; Pajares & Miller, 1994; Schunk, 1995; Pajares, 1996; Pajares, Britner, & Valiante, 2000; Pajares & Schunk, 2001; quoted by Schunk & Pajares, 2001).

Self-efficacy is usually defined as the beliefs that people have in their ability to achieve a goal or a result. Students with a strong sense of self-efficacy are intrinsically motivated and tend to see difficult tasks as a stimulating challenge. These students make a high effort to reach their goals and attribute failure to things out of their control, instead of blaming external factors; they also recover fast from setbacks and have many probabilities of achieving their personal goals.

According to the theory of self-efficacy, self-efficacy is influenced by thinking schemes, affective predisposition and behavior (Bandura, 1977, 1986). Studies carried out by some authors (Bandura, 1986; Pajares, 1996; Schunk,

1991, quoted by Contreras et al., 2005) have proven that the beliefs of self-efficacy are an indicator, which allows the prediction of the academic performance of students.

The construct of self-efficacy, derived from the theory of Bandura (1977; 1997, quoted by Brown, Concannon, Marx, Donaldson, & Black, 2016), states that the capacity of an individual to obtain a good result or to achieve a specific task is due to their belief in their capacity to accomplish it. This belief in oneself allows more motivation to perform and therefore, they have more probabilities to obtain the expected result, unlike an individual who does not believe that their work will succeed.

In this theoretical context, self-efficacy is considered a fundamental determinant on people's interests, choices, actions, behavior and performance (Bandura, 1977 quoted by Azar & Mahmoudi, 2014).

Self-efficacy includes the opinion that individuals have about their own abilities and beliefs, so they can help the person perform a specific task (Bandura, 1997). Consequently, people's self-efficacy depends on the task performed and hence, students have a self-efficacy which has the significant role of predicting academic achievement. Students with high self-efficacy are more constant and positive in their academic activities, unlike students with lower levels of self-efficacy, who are more negative (Azar & Mahmoud, 2014).

Academic antecedent is significantly related to the self-efficacy of the student (House, 1997), Tavani and Losh (2003) also proved the existence of a strong relation between academic performance and self-efficacy. Self-efficacy is part of the psychosocial factors that affect the academic performance of middle-school students in the state of Lagos (Adewuyi, Taiwo, & Olley, 2012). In their research on Hotel Management students, Lee & Mao, (2016) reach the conclusion that self-efficacy impacts academic performance in teaching and practical learning. In this regard, Kaya and Bozdağ (2016) confirmed that there is a significant relation between self-efficacy and learning.

Among those lines, the findings by Lai Mooi (2006) show that student's academic achievement are due to the variations in self-efficacy levels, if there is a higher level of self-efficacy, their academic achievement is better. In addition, Shahed, Hashmi, and Hashmi (2016, quoted by LaVar & Leon, 2016) have proved the positive correlation between achievement and self-efficacy. Hackett and Betz (1981) also discovered that students with higher self-efficacy are more willing to an imposing achievement and even to choose specialties based on

science, as well as finding that self-efficacy is different among men and women.

On the other hand, the results of Lawal, Idemudia, and Adewale (2017) suggest that academic self-efficacy has such an impact in achievement that students who are more confident in themselves have better achievement and high academic self-efficacy is an advantage to face anxiety towards exams.

By analyzing different authors the importance of self-efficacy has been proven in different educational levels; Pérez and Delgado (2006) state that having a self-efficacy inventory about learning is fundamental to strengthen the teaching-learning process since it helps to determine the students' learning deficiencies.

### **Objectives**

Students with low self-efficacy believe they cannot be successful, do not believe in their own skills, are less likely to make an effort and consider difficult tasks as threats to be avoided; these thoughts prevail in lots of teenage students and thus, the aim of this research is to determine self-efficacy strategies used by high-school students from physical-mathematical area.

The hypothesis stated in this study is: Ha: high-school students from a private institute use self-efficacy strategies to improve academic achievement in their line of study. Otherwise, null hypothesis stated, Ho: they do not use.

This research is significant because it will allow the education institute to know student's capacities and therefore, be able to improve the teaching process of subjects which have reported low achievement levels in results from exams applied by national and international institutions. This research will also contribute to strengthen the instrument posed by Pérez and Delgado (2006) since it shows the need to study - in other contexts - the evidence found by their research.

### **Method**

#### *Participants*

The sample was composed by 353 high-school students from a private school in the city of Rioverde S.L.P., 46.5% of the population is male and 53.5% is female, the age of the students ranges from 15 to 18 years old, while

53% of the students are from the second semester and 47% study the fourth semester.

### *Instrument*

Self-Efficacy Inventory for Study (IDAPE for its acronym in Spanish) posed by Pérez and Delgado was used, it includes 8 items which were created from 30 items reviewed by top specialists in social theory (Pajares, 1996); table 1 shows the coding from each one of the items. Variables were treated by structural equations to prove the strategies arising from exploratory factorial analysis. A Likert scale was used, with 10 options from 1 "Completely sure of not being able to use this strategy" to 10 "Completely sure of being able to use this strategy", being able to answer with any intermediate value from the scale to indicate their level of certainty.

Table 1. Coding of variables from IDAPE inventory

Item	Variable
1. Pay attention in class even if I have a concern at the moment.	X <sub>5</sub>
2. Ask in class when I do not understand an explanation from the teacher.	X <sub>6</sub>
3. Set goals at school and strive to achieve them.	X <sub>7</sub>
4. Do my H.W. even if I have more attractive things to do.	X <sub>8</sub>
5. Ask questions to myself to check if I understood a text.	X <sub>9</sub>
6. Relate the new concepts I am studying to others I already know.	X <sub>10</sub>
7. Plan an extensive essay or a report before writing it.	X <sub>11</sub>
8. Dedicate more hours than planned to study (when an exam is coming).	X <sub>12</sub>

### *Procedure*

IPADE was collectively applied after receiving authorization by the Psychology department of the institute using a regular class hour. Student participation was voluntary, anonymous and they were previously informed about its aim; the application of the questionnaire took approximately 25 minutes. A commitment was made to send each school a synthesized global report about which strategies are more and less difficult for students from each course considered in this study, as a way to promote the institute commitment.

Before applying the questionnaires, this research project was approved by the institute's principal, to whom the confidentiality of gathered data and voluntary participation was highlighted.

### *Research design*

The research is quantitative, non-experimental, cross-sectional and confirmatory because it is the interest of this research to acknowledge the self-efficacy shown by students. The sample was selected for the trial of non-probability sampling because the choice of the elements do not depend on probability but in the causes related to the characteristics of this research (Hernández, Fernández, & Baptista 2010). The statistic software SPSS Amos 23 was used for the data analysis. The proposed model is shown in Figure 1.

## **Results**

### *Student profile*

Of the 353 students who participate, a high percentage are from junior year, their age is between 16 and 18 years old, being 16 years old the mean and also, a high percentage (53.5%) are women.

Table 2. Demographic variables

	Variables	Percentage
Gender	Male	46.5
	Female	53.5
Year	Junior	53.3
	Sophomore	46.7
Age	16	31.7
	17	48.7
	18	19.0
	19	0.60

Besides identifying the student's profile, the interest of this research is to determine the beliefs that participants have in their skills for academic achievement.

### *Correlation matrix*

The relation between the 8 variables that compose the IDAPE inventory was determined by following a Pearson correlation presented in table 3.

Table 3. Correlation matrix

Variables	X5	X6	X7	X8	X9	X10	X11	X12
Pay attention in class	1	.339**	.268**	.273**	.168**	.205**	.163**	.190**
Ask in class		1	.409**	.218**	.272**	.172**	.174**	.328**
Set goals			1	.389**	.295**	.149**	.196**	.360**
Do the homework				1	.349**	.245**	.270**	.393**
Ask myself					1	.413**	.317**	.295**
Relate concepts						1	.436**	.238**
Plan a writing							1	.411**
Dedicate more hours to study								1

Note: \*\* The correlation is significant at level 0,01

All the relations are positively correlated and statistically significant for  $p < .01$ . The variable about dedicating more hours than planned to study indicates that when study hours are increased the student will ask more in class when he/she does not understand an explanation by the teacher, can set goals for school and strive to achieve them and plan an extensive essay or report before writing.

#### *Hypothesis testing*

Maximum Likelihood Estimation (Arbuckle & Wothke, 1999; Hu & Bentler, 1995) was used to test the hypothesis presented in this study, which determine study strategies used by high-school students from a private institute for academic achievement.

The items considered in the model comply with multi-normality, since the variable as a whole reach a value of 4.0. The results from confirmatory factorial analysis indicate that the measurement model of a factor is recurrent and has a goodness of fit with each of the items presented in the model ( $X^2=1.641$  with 1 *df* a likelihood level of .200); the values GFI=.998, CFI=.996 are satisfactory since their values tend to one and are higher than 0.5, in relation to RMSA, its value of .043, is lower than 0.5 (Byrene, 2010).

As a result from this analysis, standardized regression weights were found for four strategies that students consider for academic achievement; the strategy with higher weight is to dedicate more hours to study (0.84), followed by redaction planning (0.49), afterwards is the strategy to ask in class when an explanation from the teacher is not understood (0.39), and finally, pay attention in class even when they have a concern at the moment (0.24). See figure 1.

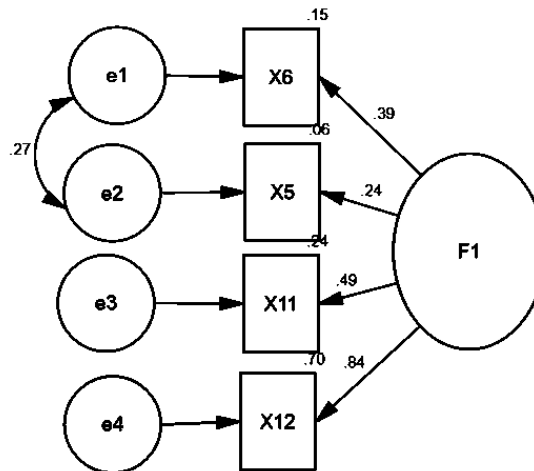


Figure 1. Self-efficacy strategies

Model	$\chi^2$	$p$	GFI	CFI	RMSA	
	1.641	df(1)	.200	.998	.996	0.043

X<sub>12</sub>= Dedicate more hours to study than planned.

X<sub>11</sub>= Plan an extensive redaction before writing.

X<sub>6</sub> = Ask in class when I do not understand an explanation from the teacher.

X<sub>5</sub>= Pay attention to class even when I have a concern at the moment.

Once the model is accepted (as a whole), the construct was evaluated in order to confirm internal coherence. The results of table 4 show that the reliability value related to the construct is 0.708, (recommended value is 0.70), which prove that the indicators are enough to represent the construct of self-efficacy.

Table 4. Reliability and Extracted Variance

Indicators	Composite reliability	Average Variance Extracted
<i>Self-efficacy</i>	0.708	0.500

The table also shows extracted variance, which must be higher than 0.50, in this case the value is 0.50, which means than more than have of the indicators' variance is accounted for the construct.



### Conclusions

This study was carried out with the objective of investigating the learning strategies used by high-school students who attend the mathematics area. Given the results obtained in this study, it is possible to state that scholars spend more hours studying than planned, make a list of the topics to develop, ask in class when they do not understand the explanation of the professor and attend classes even if they have some concern.

The results also show that from the theoretical model proposed by Pérez and Delgado (2006) which has eight variables, only four of them are significant in the studied context; these variables provide evidence that students in this level have affective traits which are important for self-efficacy.

These results strengthen the argument by (Bandura 1977; 1997, quoted by Brown, Concannon, Marx, Donaldson, & Black, 2016), which states that people have the capacity of obtaining a good result or completing a specific task because they believe in their ability to do so.

The results about the significant variables in this study provide a guideline for authorities to make teaching and learning strategies for high-school students that improve their academic achievement in order to decrease the low levels of performance in the subjects of mathematics, sciences and reading, which are evaluated by international organizations and whose results have been devastating, especially in the municipality of Rioverde, San Luis Potosí. This research will also be useful in any area where students are enrolled, not only for students from the mathematics area, who were the focus of this study.

### References

- Adeyuyi, T. O., Taiwo, O. K., & Olley, B. O. (2012). Influence of examination anxiety and self-efficacy on academic performance among secondary school students. *IFE Psychologia*, 20(2), 60-68.
- Arbuckle, J. L., & Wothke, W. (1999). *Amos users' guide, Version 4.0*. Chicago: Small Waters Corporation.
- Azar, F. S., & Mahmoudi, L. (2014). Relationship between Mathematics, self-efficacy and students' performance in statistics: the meditational role of

- attitude toward Mathematics and Mathematics anxiety. *Journal of Educational Sciences & Psychology*, 4(1), 32-42.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215.
- Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of social and clinical psychology*, 4(3), 359-373.
- Betz, N. E., & Hackett, G. (1981). The relationship of career-related self-efficacy expectations to perceived career options in college women and men. *Journal of counseling psychology*, 28(5), 399-410.
- Brown, P. L., Concannon, J. P., Marx, D., Donaldson, C. W., & Black, A. (2016). An Examination of Middle School Students' STEM Self-Efficacy with Relation to Interest and Perceptions of STEM. *Journal of STEM Education: Innovations & Research*, 17(3), 27-38.
- Contreras, F. E. J. C., Esguerra, G., Haikal, A. P. A., & Rodríguez, Adriana. (2005). Autoeficacia, ansiedad y rendimiento académico en adolescentes. *Diversitas: Perspectivas en Psicología*, 1(2), 183-194. Retrieved January 12, 2017, from <http://www.scielo.org.co/scielo.php>.
- House, J. D. (1997). The relationship between self-beliefs, academic background, and achievement of adolescent. *Child Study Journal*, 27(2), 95-110.
- Hu, L.-T., & Bentler, P. M. (1995). Evaluating model fit. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues and applications* (pp. 76-99). Thousand Oaks, CA: Sage.
- Kaya, D., & Bozdağ, H. C. (2016). Resources of Mathematics Self-Efficacy and Perception of Science Self-Efficacy as Predictors of Academic Achievement. *European Journal of Contemporary Education*, 18(4), 438-451. doi:10.13187/ejced.2016.18.438.
- Lai Mooi, T. (2006). Self-efficacy and student performance in an accounting course. *Journal of Financial Reporting and Accounting*, 4(1), 129-146.
- Laukenmann, M., Bleicher, M., Fub, S., Gläser-Zikuda, M., Mayoring, P., & von Rhöneck, C. (2003). An investigation of the influence of emotional factors on learning in physics instruction. *International Journal of Science Education*, 25(4), 489-507.
- Lawal, A. M., Idemudia, E. S., & Adewale, O. P. (2017). Academic self-confidence effects on test anxiety among Nigerian university students. *Journal of Psychology in Africa*, 27(6), 507-510.

- Pajares, F., & Miller, M. D. (1994). Role of Self-Efficacy and Self-Concept Beliefs in Mathematical Problem Solving: A Path Analysis. *Journal of Educational Psychology, 86*(2), 193-203.
- Pajares, F. (1996). Self-Efficacy Beliefs in Academic Settings. *Review of Educational Research, 66*(4), 543-578.
- Pajares, F., & Schunk, D. (2001). *The development of academic self-efficacy. Development of achievement motivation*. United States.
- Pajares, F., Britner, S. L., & Valiante, G. (2000). Relation between achievement goals and self-beliefs of middle school students in writing and science. *Contemporary educational psychology, 25*(4), 406-422.
- Pérez, E., & Delgado, M. (2006). Inventario de autoeficacia para el estudio: Desarrollo y validación inicial. *Avaliação Psicológica, 5*(2), 135-143.
- Pintrich, P., & V. De Groot, E. (1990). Motivational and Self-Regulated Learning Components of Classroom Academic Performance. *Journal of Educational Psychology, 82*(1), 33-40.
- PISA (2012). *Resultados de PISA 2012*. Retrieved from: [https://www.oecd.org/pisa/keyfindings/PISA2012\\_Overview\\_ESP-FINAL.pdf](https://www.oecd.org/pisa/keyfindings/PISA2012_Overview_ESP-FINAL.pdf)
- PLANEA (2016). *Publicación de Resultados educación Media Superior*. Retrieved from: [http://planea.sep.gob.mx/content/general/docs/2016/DifusionPLANEA\\_EMS.pdf](http://planea.sep.gob.mx/content/general/docs/2016/DifusionPLANEA_EMS.pdf)
- Schunk, D. H. (1995). Self-efficacy, motivation, and performance. *Journal of Applied Sport Psychology, 7*(2), 112-137.
- Schunk, D., & Pajares, F. (2001). *The Development of Academic Self-Efficacy*. In A. Wigfield & J. Eccles (Eds.), *Development of achievement motivation*. Purdue University, West Lafayette, IN 47907-1446. Retrieved from: <https://www.uky.edu/~eushe2/Pajares/SchunkPajares2001.PDF>
- Shahed, S., Hashmi, M. R., & Hashmi, A. M. (2016). Academic Performance, Self Efficacy and Perceived Social Support of Visually Impaired Students. *Annals of King Edward Medical University, 22*(1), 72-77.
- Tavani, C. M., & Losh, S. C. (2003). Motivation, self-confidence, and expectations as predictors of the academic performances among our high school students. *Child Study Journal, 33*(3), 141-151.

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