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Original article

# Academic performance and creativity in university students: bibliographic analysis and design of a proposal to determine their relationship

# El rendimiento académico y la creatividad en estudiantes universitarios: análisis bibliográfico y diseño de una propuesta que determine su relación

# Desempenho acadêmico e criatividade em estudantes universitários: análise bibliográfica e elaboração de uma proposta para determinar sua relação

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**ABSTRACT**

The relationship between academic performance and creative ability has recently sparked increasing interest. Although these topics have been studied for years, they are still being actively researched. Creativity does not only involve generating original ideas, but is related to skills such as critical thinking, problem solving, and intrinsic motivation, which contribute positively to academic performance. Therefore, it is important to foster creative environments in education that motivate students to investigate, explore, and delve deeper into their learning. This work seeks to explore the relationship between creativity and academic performance in Dominican university students, a topic that has been little researched in the Dominican Republic. The study sought to determine a correlation between these variables through an exhaustive bibliographic review and a qualitative approach methodology and non-experimental design, with a cross-sectional and documentary type.

The evidence found showed that, although over the years there has not been a consensus on the relationship between academic performance and creativity, some current research indicates a positive correlation between both variables. Therefore, a design was proposed to test this hypothesis by studying a sample of students from various universities in the city of Santiago de los Caballeros, selected equally between men and women; and creativity was measured through a creative intelligence test and academic performance through the cumulative academic index. It is expected to obtain significant results that could influence the country's education, promoting strategies that foster creativity as a key to academic success.

**Keywords:** creativity; correlation; design; college student; academic performance.

## RESUMEN

La relación entre el rendimiento académico y la capacidad creativa ha despertado un interés creciente recientemente. Aunque estos temas han sido estudiados durante años, todavía se investigan activamente. La creatividad no solo implica generar ideas originales, sino que está relacionada a habilidades como el pensamiento crítico, la resolución de problemas y la motivación intrínseca, las cuales contribuyen positivamente al rendimiento académico. Por ello, es importante fomentar entornos creativos en la educación que motiven a los estudiantes a investigar, explorar y profundizar en sus aprendizajes. Con este trabajo se busca explorar la relación entre la creatividad y el rendimiento académico en estudiantes universitarios dominicanos, un tema poco investigado en la República Dominicana. El estudio pretendió determinar una correlación entre estas variables mediante una revisión bibliográfica exhaustiva y una metodología de enfoque cualitativo y diseño no experimental, con corte transversal y de tipo documental. La evidencia encontrada demostró que, si bien a través de los años no ha existido un consenso sobre la relación entre rendimiento académico y creatividad, algunas investigaciones actuales indican una correlación positiva entre ambas variables. Por ello se propuso un diseño para comprobar esta hipótesis al estudiar una muestra de estudiantes de diversas universidades con delimitación en la ciudad de Santiago de los Caballeros, seleccionados equitativamente entre hombres y mujeres; y se midió la creatividad mediante una prueba de inteligencia creativa y el rendimiento académico a través del índice académico acumulado. Se espera obtener resultados significativos que podrían influir en la educación del país, promoviendo estrategias que fomenten la creatividad como clave para el éxito académico.

**Palabras clave:** creatividad; correlación; diseño; estudiante universitario; rendimiento académico.

**RESUMO**

A relação entre o desempenho acadêmico e a capacidade criativa tem despertado cada vez mais interesse recentemente. Embora esses tópicos tenham sido estudados há anos, eles ainda estão sendo ativamente investigados. A criatividade não envolve apenas a geração de ideias originais, mas também está relacionada a habilidades como pensamento crítico, resolução de problemas e motivação intrínseca, que contribuem positivamente para o desempenho acadêmico. Portanto, é importante promover ambientes criativos na educação que motivem os alunos a investigar, explorar e aprofundar seu aprendizado. Este estudo busca explorar a relação entre criatividade e desempenho acadêmico em estudantes universitários dominicanos, um tópico que tem sido pouco pesquisado na República Dominicana. O objetivo do estudo foi determinar a correlação entre essas variáveis por meio de uma revisão exaustiva da literatura, de uma abordagem qualitativa e de um projeto não experimental, transversal e do tipo documental. As evidências encontradas mostraram que, embora ao longo dos anos não tenha havido consenso sobre a relação entre desempenho acadêmico e criatividade, algumas pesquisas atuais indicam uma correlação positiva entre as duas variáveis. Portanto, foi proposto um projeto para testar essa hipótese por meio do estudo de uma amostra de alunos de várias universidades da cidade de Santiago de los Caballeros, selecionados igualmente entre homens e mulheres; a criatividade foi medida por meio de um teste de inteligência criativa e o desempenho acadêmico por meio do índice acadêmico cumulativo. Espera-se obter resultados significativos que possam influenciar a educação no país, promovendo estratégias que incentivem a criatividade como chave para o sucesso acadêmico.

**Palavras-chave:** criatividade; correlação; design; estudante universitário; desempenho acadêmico.

## INTRODUCTION

The word creativity is continually appearing in the various mass media and seems to be a very important tool in different fields of work, and which, in turn, is strongly related to the expression of art, music, science, among others (Chacón Araya, 2005). Etymologically, the origin of this term is found in the Latin word creare, which means to create and/or do something new (Vázquez Gestal,

2000). However, since the current century, creativity has been associated with the problem of its conceptualization, the term has been related to various meanings, since it is a label attached to very diverse realities, and we can speak of verbal, artistic, scientific, musical, plastic, organizational creativity, etc.

Since Guilford's famous inaugural address in 1950, the scientific and psychometric study of creativity has gained various positions, enabling not only its promotion and measurement, but also understanding the relationship of creativity with other constructs. The relationship between creativity, personality, intelligence and professional success has been studied; as well as the relationship between creativity and academic success (Ferrando *et al.*, 2018; Chacón Araya, 2005).

As far as we know, to solve current problems, skills related to critical thinking, innovation and creativity are necessary, which are fundamental in the 21st century. In turn, Hernández *et al.* (2015), as cited in García and García (2018), mention the importance of training creative and innovative professionals; this motivated them to defend the idea of including these skills in the new proposals for evaluation methodologies and strategies.

That said, it is more than evident that creativity is inherent to human beings and constitutes an indispensable vital act in different contexts (López Fernández *et al.*, 2022). This is why it is considered vitally important to incorporate creativity as a curricular competence for students' adaptation to social demands (García and García, 2018).

Following the reference on the relevance of the development of creativity and education, according to Runco and Sakamoto (1999), as cited in Barbachán Ruales *et al.* (2020) "we are mainly concerned with theories linked to discovery and problem formulation, since the role of problem formulation in creative processes is highlighted."

Creativity and its promotion through practices in the university environment are currently a topic of interest. For this reason, various investigations have been carried out that analyze these variables. According to Roke and Kalis (2015), as cited in Acosta Molina *et al.* (2018), this line of research began when Getzels and Jackson (1962) reported the first results of an investigation that sought to establish the role of creativity in school results, and whose findings were complemented by Torrance (1962), Yamamoto (1964) and Asha (1980).

Regarding the variable of academic performance, as with creativity, its concept has a complex and multidimensional character, and is related to the outcome of learning; in turn, it has different conceptions by different authors and experts on the subject. In an integral manner, there is a consensus that suggests that academic performance encompasses different complex variables in themselves, such as pedagogical, institutional, sociodemographic and psychosocial, as indicated by Montero *et al.* (2007), as cited in Garbanzo Vargas (2013).

According to Touron (1984), as cited in García (2015), academic performance is described as a result promoted by the educational activity of the teacher and produced by the student himself, whether or not autonomously directed; not being the product of a single capacity, but rather the synthetic result of a sum of factors. Its approach has been concentrated mainly on primary and secondary education levels, while studies at the tertiary level are considered scarce.

This is consistent with what was proposed by De Miguel *et al.* (2002), as cited in Garbanzo Vargas (2013), who stated that academic performance in university students would represent a strategic indicator for the assessment of quality in Higher Education, and this is the result of the union of different factors that intervene in the academic life of the student.

Regarding the relationship between both variables, Acosta Molina *et al.* (2018) state that "the results between creativity and academic performance have been contradictory over time"; as García and García (2018) state, mentioned by the same author:

> Currently, there is no homogeneous line regarding the relationship between creativity and performance, since, depending on the author and his research, null, low or high correlations can be found between these variables. However, other new empirical evidence shows that there is a positive correlation between creativity and academic performance, and that this relationship depends experimentally on how creativity is measured, the subject being evaluated and the evaluation procedures used by the teacher.
>
> For more than six decades, the question of whether creativity and academic performance are related has been a focus of theoretical and empirical work. The answer to whether there is a relationship between the two variables has proven to be complicated by several types of measures and potentially intervening factors. Results

> from previous research have run the gamut from positive to negative correlations to no correlation at all.
>
> Regarding this issue within the educational system of the Dominican Republic, it faces specific challenges that require a deeper understanding of the factors that influence the academic performance of university students, especially because the educational field has had a historical tendency to embrace traditionalist philosophies, prone to employ conventional didactic strategies that encourage convergent thinking and rote learning (Acosta Molina *et al.*, 2018).

Fortunately, Dominican Higher Education has seen an increase in the promotion of creativity as an integral part of the educational process. University institutions in the Dominican Republic are implementing innovative pedagogical approaches that seek to stimulate creativity. This involves incorporating more active teaching methods, encouraging research and problem solving, as well as using technologies and resources that allow for students' creative expression.

It should be noted that, since creativity has currently been shown to be an essential skill for academic and professional success, it is crucial to investigate how it relates to academic performance in the educational environment. However, despite the theoretical relevance of the relationship between both variables, there is a lack of empirical research in the Dominican context. This gap in knowledge limits the understanding of how and why it is important to promote creativity in university students in the Dominican Republic. In the country, there is no evidence of any literature that provides a result on this unknown at the level of Higher Education. Therefore, it is considered pertinent to evaluate these variables in the university context of the country, to measure whether or not there is a correlational result, in order to develop techniques and methods based on the result obtained, especially in the event that a positive relationship occurs.

If the hypothesis that both variables are positively correlated is confirmed, this study proposal will have multiple benefits, since the findings could inform the design of pedagogical strategies and teacher training programs that promote the development of creativity as a tool to improve academic performance. Likewise, understanding this relationship could support the implementation of more effective educational policies focused on the advancement of creative skills.

In the initial stage of this work, an exhaustive analysis of the scientific and pedagogical literature was carried out to understand the theoretical connections between creativity and academic

performance in the university context. Subsequently, a design proposal was made with practical application, with which we aspire to understand the relationship between creativity and academic performance in university students in the Dominican Republic, limited to the population of the city of Santiago de los Caballeros. Its usefulness aims to continue exploring these variables, to determine whether or not creativity predicts academic success in Higher Education students, through comparison with academic performance.

The general objective of this work is to "analyze bibliographic aspects and design a proposal that determines the relationship between creativity and academic performance of university students in the Dominican Republic."

## MATERIALS AND METHODS

This work used a qualitative approach methodology and a non-experimental design, with a cross-section and documentary type, since it began with the bibliographic review and analysis, and proposes a design that aims to confirm the correlation between creativity and academic performance.

After analyzing the existing information, the proposal was designed to measure the variables, which was validated by two academic researchers. Within the planning of the protocol and methodology of the project, it is suggested to use a population of university students selected in a probabilistic manner and using the stratification sampling method; a number of 25 female participants and 25 male participants per university, which would give a total of 50 volunteers from all undergraduate courses at public and private universities in the city of Santiago de los Caballeros. This type of sampling to be used has the utility of subdividing the universe into homogeneous segments (strata), to then select a sample from each stratum independently. This approach will seek to guarantee an equitable representation of the genders in the sample and will include students from both public and private universities.

The variable creativity is proposed to be measured through the CREA test, a creativity assessment instrument that evaluates the ability to formulate questions through four games that consider the following factors: fantasy, fluency, flexibility, originality, elaboration, special details and title. According to its authors, the CREA test is based on a theoretical model that focuses on cognitive operations that are not identifiable with creative production, but are necessary for its exercise. From this perspective, and with an approach that is more similar to the traditional methods used to assess

intelligence due to its foundation, although very close to the assessment of divergent production in terms of content, a measurement system is introduced that is presumed to be able to adjust to statistical validation standards and, therefore, perhaps allow a more objective assessment of creativity. Its application can be individual or collective and can last 10 minutes. The test consists of presenting a sheet with a drawing and, in a given time of four minutes, the individuals have to generate as many questions as possible.

Academic performance will be obtained with the cumulative academic index of the sample, which consists of the weighted average of the grades obtained from all subjects taken in a period.

In practice, many studies that seek to understand the reasons behind academic success or failure often measure student performance through grades or the attainment of academic certifications. Thus, a significant part of this research analyzes the results in a specific course or in the set of subjects of an educational institution. However, it is important to note that this approach can be biased, since the grading and evaluation criteria vary considerably between teachers, subjects, programs, schools and even universities, which could significantly influence the measurement of performance.

However, several authors consider that grades are the best indicator to measure academic performance, arguing that instrumental subjects, such as Language and Mathematics, are those that determine overall performance.

In other words, although using grades alone to assess academic performance in Higher Education carries risks, mainly due to the subjectivity of teachers, they remain the most common method used to measure academic performance.

For practical application, it is proposed that the academic index be divided by the official value scales (Table 1).

**Table 1.** Academic index assessment scale

| Numeric from 0 to 100 | Numeric from 0 to 4 | Conceptual |
|---|---|---|
| 100 | 4 | Excellent |
| 80-99 | 3 | Well |
| 70-79 | 2 | Satisfying |
| 0-69 | 0-1 | Deficient |

Data collection begins with a request for permission to carry out the proposal, through the academic entities of the selected universities. Subsequently, a population of students from all grades will be asked to participate voluntarily, dividing the group into two strata (female and male). Once the sample size per university accepts this initiative, they will be given a form so they can enter their data and their informed consent. After the study sample is closed, the CREA test will be applied to them, individually and online. In addition to this, the weighted average of the academic performance of the participants will be collected, which will be obtained through the review of the history of each of those involved, who accepted in the informed consent.

Once the results of the CREA test and the average academic performance are obtained, a descriptive analysis of both variables will be obtained and the results will be analyzed. The data obtained from the correction of the test will be tabulated and analyzed parametrically using the Pearson correlation coefficient through the IBM SPSS software. In addition, descriptive analyses will be carried out to determine the levels of creativity and academic performance through the mean, median and standard deviation, as well as the representation of the percentage between female and male students.

To confirm this assumption, the practical implementation of the design proposed below will be necessary (Table 2).

**Table 2.** Phases and activities of the proposal

| Phase | Activities |
|---|---|
| 1. Planning the project protocol and methodology | • Review the research design, including the choice of variables, measurement methods, and sampling strategy.<br>• Specify the specific objectives and goals of the project.<br>• Develop a detailed work plan containing resources, costs and estimated time, completing the planning, development, monitoring, entry into operation and closing activities. |
| 2. Validation of the proposal | • Validate the research design with experts. |
| 3. Recruitment | • **Stage 1. Contact the institutions**<br>  ○ Contact the universities where you intend to carry out the research.<br>  ○ Obtain informed consent from each institution.<br>  ○ Assign collaborators within the institutions.<br>• **Stage 2. Sample selection**<br>  ○ Identify and contact potential participants.<br>  ○ Select a sample of 25 female and 25 male participants per university, using stratified sampling.<br>  ○ Obtain informed consent from each member. |
| 4. Information gathering | • **Stage 1. Application**<br>  ○ Assign the days for the application of the CREA test.<br>  ○ Administer the CREA test collectively, in groups of a maximum of 20 people.<br>  ○ Collect academic indexes from the selected sample.<br>• **Stage 2. Creating a database**<br>  ○ Get the results of the CREA test.<br>  ○ Ensure that the project complies with all ethical standards, such as informed consent and data confidentiality. |

| | |
|---|---|
| | ○ Convert the different grading scales of universities into a single measurement scale.<br>○ Obtain the weighted average of the academic performance of the sample.<br>○ Perform statistical analysis of the correlation between creativity and academic performance using SPSS software. |
| 5. Data analysis | • Determine whether there is a positive or negative correlation. |
| 6. Interpretation of results | • Conduct a descriptive analysis of both variables, comparing the results between the female and male groups. |
| 7. Report writing | • Write a final report that includes a complete description of the study, objectives, methodology, results, and conclusions. |
| 8. Dissemination of results | • Present the results at academic conferences and to professionals in the field of education.<br>• Publish the results in different academic and/or scientific search engines. |

## RESULTS

According to the results obtained through the bibliographic review, it is revealed that, although over the years there has not been a clear consensus on the relationship between academic performance and creativity, some current research indicates a positive correlation between both variables.

This could lead to the hypothesis that creativity and academic performance could have a positive correlation in university students in the city of Santiago de los Caballeros in the Dominican Republic. In addition, evidence is shown of the existence of causes and factors that promote or intervene in the development of creativity and academic performance. Although at the moment these findings are not related to the Dominican university context, they provide a solid basis for understanding the factors that could influence the academic performance of Higher Education students in the country, which will be important when comparing results in research at a local level.

To confirm what has been documented, a work plan is proposed to help develop or verify this hypothesis by carrying out a series of activities. Therefore, it is essential to understand that a design must contemplate a phased execution, allowing adjustments based on the feedback obtained from partial results or the incorporation of new techniques that provide a greater quantity and quality of data. For this reason, the proposal presented follows a systematic approach, integrating activities supported by different authors in the consulted literature.

For the practical implementation of the design, the use of the CREA test is proposed, since it contains a validated design and is used for research that seeks to understand creativity, due to its direct approach, ease of use, educational relevance, and ability to provide quantifiable and comparable data. The results obtained will be correlated with the accumulated index of the sample.

Regarding the use of the academic index based on the grades of the sample, various studies indicate that the grades obtained are the most reliable indicator to evaluate academic performance, since they reflect the achievements made in the different aspects of learning throughout the student's life. These achievements cover personal, academic and social dimensions.

## DISCUSSION

In the exhaustive review of the literature it has been possible to highlight that, although it is common that in some investigations on the relationship between academic performance and creativity no conclusive data are found, this is confirmed by more up-to-date studies such as the one carried out by Gajda. *et al.* (2017), in which they indicate that "previous research has shown, on average, a positive (albeit modest) relationship between creativity and academic performance, which is significantly moderated by the types of measures used to assess creativity and achievement." However, they point out that this should not be considered the definitive answer; rather, such results provide researchers with a baseline correlation that they can use in subsequent studies to make comparisons and conduct further explorations.

In a correlational study carried out by Bano *et al.* (2021) on students from three universities in Pakistan, no relationship was found between both variables, but they agree that this is because students rely on memorization when passing exams, which would influence the results that are assessed for academic performance.

In a recent meta-analysis conducted by Manaf *et al.* (2022) conclude that, by using the correlation approach in 41 academic articles on creativity and learning achievement, researchers have found that there is a positive and significant correlation between creativity and learning achievement in primary, secondary and higher education.

The authors highlight the importance of creativity in education, emphasizing how the development of creative skills can improve problem solving, critical thinking, and the ability to innovate. However, despite the theoretical relevance of this topic, there is a lack of empirical research in the Dominican context.

The methodology proposed in this design will provide valuable input, as it will allow obtaining detailed information on the relationship between creativity and academic performance of university students in the city of Santiago de los Caballeros in the Dominican Republic. Through the application of the CREA test and an exhaustive review of the academic history of the sample presented, relevant data will be collected that will allow a better analysis and understanding of these variables.

The results obtained through the CREA test can be compared with the academic performance records of the participants. This theoretical-practical stage will lay the foundations for future phases of research in which the practical application of the proposed design will be carried out, thus allowing a more in-depth exploration of the relationship between creativity and academic performance in a university context and an assessment of the potential of creativity as a predictor of academic success.

The interest in carrying out a descriptive analysis of the results and comparing them between female and male university students is based on the fact that this is an issue that is still unresolved by scientific research at present. The reasons for this difference seem to be unclear and those that have been provided so far are not sufficient. One of the explanations is that the differences are due to biological and genetic conditions, since traditionally more research is carried out on men than on women. Studies carried out by Eysenck (1993), as cited in Chacón Araya (2005), allude to the fact that there are a series of social and cultural pressures that favor the creativity and performance of men and have hindered the creativity of women.

However, in studies by Aranguren and Irazábal (2012); Bindu and Thomas (2006); Chiecher et al. (2018); Elisondo (2013); Bermejo et al. (2014) and Kaufman (2006), as cited in García and García (2018), it is highlighted that women are above men when their creative actions are measured. Since

this dilemma exists regarding the different studies, the authors mention the need for more studies to address this issue.

Regarding data collection and analysis, researchers such as Miles *et al.* (2014) recommend carrying out the collection and exploration of results in a systematic and rigorous manner to effectively answer the research questions. To do this, they seek to use IBM SPSS software, which will automatically calculate the Pearson correlation coefficient between the selected variables.

For the formulation of hypotheses, after verifying the correlation between creativity and academic performance, Fraenkel *et al.* (2012) suggest providing guidance and structure for data collection and analysis, facilitating the interpretation of the results. To achieve this, statistical results must be deduced from the research question or problem and the practical implications of the findings must be discussed. Since the theoretical relevance for this proposal is considered, it is possible to compare it with the results obtained.

After the relevant analyses and conclusions, various authors underline the importance of interpreting the results in a manner consistent with the theoretical framework, and communicating them clearly and effectively so that they are understandable and useful for the academic and professional community.

The probability of achieving success when carrying out the proposed design will increase significantly by actively following the proposed planning and its respective short- and long-term monitoring.

The results of this study could have significant implications for education in the Dominican Republic. If the existence of a positive relationship between creativity and academic performance is confirmed, it would open an opportunity for the design of educational strategies focused on fostering creativity as a key factor in improving student success.

In conclusion, this research design proposal seeks to fill the gap in understanding the relationship between creativity and academic performance in university students in the Dominican Republic. The results obtained from this study can contribute to improving educational practices and policies in the country, fostering a pedagogical approach that values and promotes creativity as a fundamental element for the academic success of Dominican students.

For the successful implementation of the proposal that will be carried out when carrying out the proposed design, the following is recommended:

- Collect data rigorously to avoid bias and errors in the information.
- Interpret results with caution.
- Carry out the standards of ethics and consent.
- Conduct ongoing assessments to identify potential areas for improvement.
- Communicate results through reports, presentations and publications.
- Recommend strategies and applications in the educational field based on the findings.

All of this, taking into account that Higher Education in the Dominican Republic still faces an important challenge, which involves implementing an educational transformation to establish innovative pedagogical approaches that support an enriching education.

Furthermore, it is recognized that, when applying this design proposal, some limitations may arise, such as: the lack of availability of participants representing the sample, the lack of monetary acquisition for the data collection resources, the lack of authorization from the university institutions, and the little or no collaboration of the academic and administrative staff of the same. To overcome these barriers, greater financial and time resources will be required when executing the proposal; this can be achieved by presenting the project in research funding competitions or promoting the initiative as an integral part of the research and innovation plans of the universities where it is carried out.

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**Conflict of interest**

Authors declare no conflict of interests.

**Authors' contribution**

The authors participated in the design and writing of the article, in the search and analysis of the information contained in the consulted bibliography.