

Exploring Visual Creativity and Its Dimensions in Students of Online Training Program

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Abstract

This study evaluated and compared the levels of artistic creativity among undergraduate university students enrolled in distance learning programs across five distinct programs at a local university. The assessment focused on four key components: Fluency, Flexibility, Originality, and Elaboration. The results revealed significant differences in creativity between the programs, with Social Work students demonstrating higher levels of creativity compared to those in Tourism, and Marketing students surpassing their counterparts in the Tourism program. However, no significant differences in creativity were observed among other program pairings. Notably, while all programs excelled in the aspect of "Elaboration," "Fluency" displayed a lower performance in the swift generation of ideas. The findings underscored the potential influence of myths, beliefs, and dogmas on creativity, particularly among Theology students. Moreover, the visual expression styles employed by students in the Tourism program may not align with the kinesthetic nature of their career profiles. These findings emphasize the imperative for further research to explore these factors. In conclusion, this study highlights the significance of tailored approaches to nurture creativity within distinct undergraduate programs with distance learning components and the interplay of creative dimensions in professional preparation across various fields.

Keywords

Creativity, Undergraduate Programs, Artistic Assessment ¹

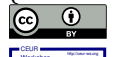
1. Introduction

Creativity is defined as a form of thinking that emerges in an individual in response to the perception of a problem and is composed of multiple elements, such as sensitivity, fluency, flexibility, elaboration, originality, and redefinition [1]. In this sense, an art subject (painting, music, theater, etc.) within a STEAM approach is essential for cultivating creativity in schools, and its development nurtures the total brain, which requires and demands continuous doses of creative stimulation [2, p. 332]. In the university context, the Peruvian educational system has, by law, established the obligation to include general education courses in higher-level study programs [3]. Among these courses is Art, which aims to provide comprehensive education for future professionals. The precedents of highly creative students who have obtained exceptional scores in verbal expression tests often coincide with high performance in one or more forms of art and visual expression. This is evident in the awards students have received in disciplines such as music, art, theater, and other competitions [4, p. 244]. Numerous studies have been conducted to analyze the validity of tests designed to assess creativity, including its key components: Fluency, Flexibility, Originality, and Elaboration.


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1.1. Fluency

Fluency refers to the ability to generate many ideas, solutions, or creative expressions within a specified time frame. It enables the use of cognitive resources to produce multiple responses continuously during the planning, execution, and control of an activity and its outcomes [5]. It involves imagination, free association of remembered elements, the flow of relationships, convergent production, associations, and the establishment of multiple connections [2]. In an educational context, fluency is not only evident in problem-solving but also in artistic expression, creative communication, and the generation of new perspectives. Its relevance in education is emphasized [6, p. 283]. In the artistic domain, fluency in drawing and painting refers to the ability to express oneself continuously and without apparent effort, promoting free expression, the use of various techniques and media, and the exploration of ideas and styles. Fluency is associated with the quantity of responses, while quality is linked to the uniqueness of the responses [7, p. 23].

1.2. Flexibility

Flexibility in creativity is not only important in the artistic domain but also in other areas of creative expression, such as science [8]. It allows artists to explore new ideas, approaches, and techniques. Cognitive flexibility, for instance, is the ability to adapt and shift mental focus, enabling them to see things from different perspectives and find creative solutions to challenges [9]. They challenge conventions and explore new forms of expression thanks to the skill of shifting focus, which is linked to a greater number of responses [10]. Flexibility in the creative process leads individuals to experiment with a wide variety of materials and techniques to create their work [11]. It aids in creatively solving complex problems in the creative process [12] and is associated with divergent thinking, working memory, and mental speed [13, p. 11].

1.3. Originality

The quest for originality is one of the most significant aspects of creativity because it "does not imitate others" and is "contrary to the usual"[14]. It is closely related to creativity as it involves producing something in a novel manner, characterized by rupture, divergence, and differentiation. However, even though creativity is vital in art, not everything creative is necessarily original. Artists can make creative contributions in various fields without necessarily creating something entirely new [15]. Evaluating originality in a painting or visual expression is a subjective process [16]. In a work of art, it is subjective and depends on various factors such as the artist's personal style, experimentation with techniques and materials, the novelty of the concept, and how formal elements like composition, color, and technique are handled [16].

1.4. Elaboration

The construct refers to an individual's capacity to develop and refine an original idea or production, achieving levels of complexity and detail [17]. The "elaboration" dimension in creativity pertains to the ability to add details, fill gaps, and expand upon initial ideas or concepts [4].

In this study, our goal was to investigate and compare the level of achievement in creativity among four groups of undergraduate students from different professional programs at a private university offering distance education. These students undertook the subject of Art Workshop during an academic quarter.

2. Method

The aim of this research was to determine if there are significant differences in the level of achievement in artistic creativity among at least two groups of students from a set of five undergraduate professional programs offered through online and distance education.

2.1. Design & Participants

The study adopts a non-experimental quantitative approach to analyze differences in means and compare levels of achievement in visual creativity, considering four main components: Fluency, Flexibility, Originality, and Elaboration. These aspects were developed within the context of the 'Art Workshop' course. The total population of students enrolled in online and distance education programs amounts to 420. For this research, a convenience sampling approach was used, selecting course sections with a similar number of students in each sample. Five groups of students from various undergraduate professional programs were chosen, with the following distribution: Theology: 35 students (14%); Marketing and Commercial Management: 50 students (20%); Tourism and Gastronomy: 48 students (19%); Secondary Education: 54 students (22%); Social Work: 60 students (24%), totaling 247 students.

2.2. Instrument

The Data Collection Instrument was based on the Tests of Creative Thinking (TTCT), which evaluates non-verbal, graphic creativity. The Figural Test consists of three activities, including Picture Construction, Picture Completion, and Parallel Lines [4], and the (TAEC) Test for Assessing Creativity Expression [22]. From both tests, four fundamental dimensions of creativity were extracted: fluency, flexibility, originality and elaboration. An adaptation of the instrument was developed through the elaboration of an observation sheet (see fig. 1). The rubric is used to assess 4 dimensions of visual creativity with a scale of 5 levels of achievement: very high (5), high (4), medium (3), low (2), very low (1) for use in artistic works (collage, drawing and painting) presented by the students in the workshop. The instrument used was validated by two experts in the field, and its reliability was evaluated using the McDonald statistic, which yielded a result of 0.845. This value can be considered as a reasonable indicator of reliability.

ARTISTIC EXPRESSION EVALUATION RUBRIC

Name:		Undergraduate Program:			Date:
CRITERION	5	4	3	2	1
FLUENCY	Present 5 or more sketches. The fluency is exceptional, and the sketches demonstrate a meticulous planning process and integrate coherently into the final work	Present at least 4 sketches. The fluency is solid, and the sketches show effective planning. The elements integrate coherently into the final work.	At least 3 sketches are presented. The fluency is sufficient, and some planning in the work can be observed. The sketches contribute to the cohesion of the final composition	Less than 3 sketches are presented. The fluency is limited, and although there are some signs of planning, the lack of preliminary proposals negatively affects the quality of the final work.	No sketches are presented. The work lacks fluency, and there is no evidence of a planning process or idea development.
FLEXIBILITY	It's exceptional. The work presents a creative and expert exploration and adaptation of the elements of the work. Variation and experimentation are evident in all aspects of the composition.	The flexibility is solid. The work shows a conscious effort to explore and adapt the elements of collage. There are interesting variations and experimentation in composition.	The work demonstrates adequate flexibility. The elements present variations and adaptations, although there are areas of experimentation that could be improved.	Flexibility is limited. Although some elements have some variation, in general, the work shows rigidity in the use of materials and techniques.	The work lacks flexibility. The elements of the work are rigid and not very adaptable. There is no evidence of experimentation or exploration in the composition.
ORIGINALITY	The work is highly original and unique in its approach. Demonstrates extraordinary creativity in the choice of elements, the combination of techniques and the overall presentation.	The originality is solid. The work shows a conscious effort to explore original ideas and innovative techniques in the work and composition as a whole.	It presents some original ideas, elements or approaches that contribute to the composition of the work, although there could be areas where it could be improved.	Originality is limited. Although there may be attempts to incorporate some original elements, in general, the work is still very conventional and not very innovative.	The work lacks originality. Use common and predictable ideas, elements and techniques in the work. The composition does not bring anything new or interesting.
ELABORATION	The work shows meticulous attention to detail and precise execution. The elements are seamlessly integrated, creating a highly elaborate and cohesive work of art.	The work shows a conscious effort to organize the elements and maintain visual cohesion. The details are taken care of carefully, but there is still room for improvement.	Elements are reasonably organized, but there may be areas where attention to detail and accuracy in execution could be improved.	Processing is limited. In general, the work lacks unity and coherence. There may be indications of carelessness in some respects.	The work shows an insufficient elaboration. The elements seem messy and there is evidence of little attention to detail, and the result seems rushed.

Note: This rubric is used to evaluate various forms of artistic expression such as Collage, Drawing, Painting, etc

Figure 1: The evaluation rubric contains 4 criteria or dimensions of creativity and a 5-level rating scale where 1 is the lowest value and 5 is the highest.

2.3. Procedure

Over a period of 10 weeks, artistic works presented by students throughout an academic quarter were collected. These works were assessed using a twenty-point scoring system, commonly used in the university setting, where values are assigned as follows: from 1 to 10 is considered very low, from 11 to 14 is rated as medium or in progress, from 15 to 17 is considered a high or desired level, and from 18 to 20 is rated as very high or outstanding. The evaluation of the artistic works was carried out by two expert teachers in art and creativity, using an assessment instrument adapted and specifically designed for this purpose.

2.4. Data Analysis

The data was processed and analyzed through a descriptive analysis, presented in tables with measures of central tendency and standard deviation. A one-way analysis of variance (ANOVA) was employed to compare means and determine which of the student groups achieved a higher level of creativity in their work. The normality of the sample data was assessed using the Kolmogorov-Smirnov test. Based on the results, the non-parametric Welch test was applied. The significance level for the comparison was set at $p < 0.05$. Data analysis was conducted using the statistical software Jamovi 2.3.

3. Results

The demographic data of the students reveal a gender distribution of 56% females and 44% males. The average age is 34 years, ranging from a minimum age of 18 to a maximum age of 56. Table 1 presents the sample units corresponding to each group or field of study, along with the mean level of creative achievement of the students on a 20-point scale. Additionally, the standard deviation of these values is displayed.

Table 1
Level of Achievement - Group Descriptions

Variable	Undergraduate Programs	N	Mean	SD	SE
Creativity	Education	45	15.5	2.09	0.311
	Marketing	49	15.9	2.08	0.297
	Theology	33	14.6	2.72	0.474
	Social Work	41	16.5	1.55	0.242
	Tourism	25	13.8	2.60	0.520

We can observe that, in general (Figure 2), the Social Work program has the highest average in terms of creative achievement, followed by the Marketing program, suggesting that students in these programs have, on average, higher levels of artistic creativity. On the other hand, (Table 1) the Theology program has the lowest mean, indicating lower levels of artistic creativity compared to the other programs. In the Theology program, the standard deviation is relatively high, indicating that scores vary considerably among the students. In contrast, in the Social Work program, the standard deviation is low, suggesting that scores are more consistent within this group.

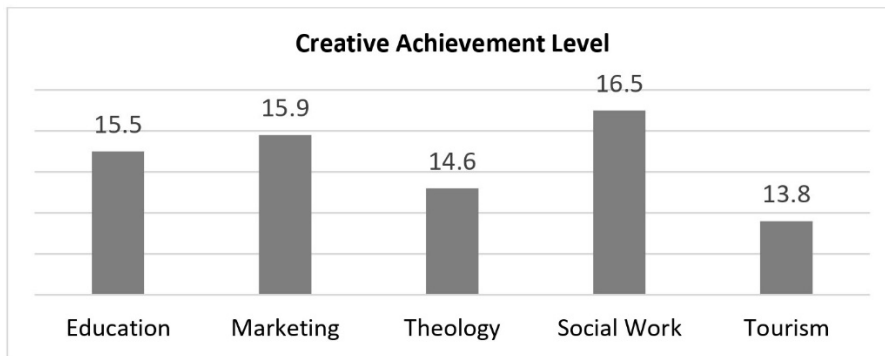


Figure 2: Creative achievement level among undergraduate university programs.

Table 2
Level of Achievement - Group Descriptions

Dimensions	Undergraduate Programs	N	Media	Standard Deviation
Elaboration	Education	45	16.0	2.52
	Marketing	49	15.4	3.77
	Theology	33	15.6	3.97
	Social Work	41	16.9	1.77
	Tourism	25	15.4	2.60
Originality	Education	45	16.4	2.86
	Marketing	49	16.6	2.74
	Theology	33	15.6	3.59
	Social Work	41	16.9	2.46
	Tourism	25	12.9	4.48
Flexibility	Education	45	15.1	3.30
	Marketing	49	14.0	2.69
	Theology	33	14.8	3.04
	Social Work	41	15.8	2.13
	Tourism	25	14.1	2.96
Fluency	Education	45	14.5	3.40
	Marketing	49	17.6	3.55
	Theology	33	12.4	5.00
	Social Work	41	16.5	2.67
	Tourism	25	12.9	3.97

In Table 2, it is observed that in the "Elaboration" dimension, the level of creativity is high in all academic programs. Social Work leads with an average score of 16.9, followed by Theology, Marketing, and Tourism with similar scores but variability in their results. This suggests that students in these programs present well-detailed artistic works. Regarding "Originality," Social Work has the highest score (16.9), indicating a moderate level of originality. Tourism has the lowest score (12.9), showing lower average originality. Education, Marketing, and Theology have close scores. In "Flexibility," Social Work leads with a moderately high average score (15.8), while Marketing has the lowest score (14.0). Education, Theology, and Tourism exhibit intermediate levels. In terms of "Fluency," Theology and Tourism obtain lower scores, suggesting limitations in the fluid generation of ideas, whereas Marketing stands out with a high score (17.6).

Significant differences in visual creativity are found among academic programs. Social Work and Marketing appear to foster a higher level of creativity compared to Education, Theology, and Tourism. Furthermore, variability in creativity levels is observed within each program, indicating the need for specific approaches to stimulate creativity in each of these study aspects. The Levene test was applied to justify the use of Welch's analysis of variance in the statistical processing.

Table 3
One-Way ANOVA (Welch's)

Variable	F	df1	df2	p
Creativity	7.21	4	82.6	< .001

The level of significance (alpha, α) represents the probability of committing a Type I error and is commonly set at 0.05 (5%) as a default value in the educational context. The results of the Welch's analysis of variance indicate that there is a significant difference in creativity among at least two groups of students from different undergraduate programs. Since the p-value is less than 0.001, we can conclude that these differences are not the result of chance and are statistically significant. This suggests that students from the five academic programs exhibit varying levels of development in terms of artistic and visual creativity.

To gain a more detailed understanding of the specific differences between the programs, post hoc comparisons or additional tests were conducted in order to identify which groups differ from each other.

Table 4
Level of Achievement - Group Descriptions

Carers	Values	Marketing	Theology	Social Work	Tourism
Education	Mean difference	-0.411	0.885	-0.965	1.705
	p-value	0.874	0.528	0.113	0.055
Marketing	Mean difference	—	1.296	-0.554	2.116 **
	p-value	—	0.155	0.601	0.009
Theology	Mean difference	—	—	-1.849**	0.821
	p-value	—	—	0.009	0.770
Social Work	Mean difference	—	—	—	2.670***
	p-value	—	—	—	< .001

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

The results of the post hoc Games-Howell analysis in Table 4 compare creativity levels among undergraduate students from five different programs. Firstly, "Social Work" exhibits a significant difference in creativity achievement with a 2.67-point advantage compared to "Tourism." Statistically significant differences in creativity are observed between the "Marketing" and "Tourism" programs (2.1.1); ($p < 0.009$). On the other hand, creativity in "Theology" shows a significant negative difference of -1.849 when compared to "Social Work" ($p < 0.009$). The level of creativity in "Education" is lower than that of "Social Work" but higher than "Tourism," although these differences are not significant ($p > 0.05$).

Furthermore, with a p-value of 0.601, which is greater than 0.05, no significant differences in creativity were found between the "Marketing" and "Social Work" programs. Similarly, no significant differences were observed between "Education" and "Marketing" (0.874), and "Education" and "Theology" (0.528). No significant differences in creativity achievement were found in the "Tourism" program in comparison to the "Education" and "Theology" programs.

4. Discussion and Conclusions

The study's results revealed significant differences in artistic creativity among some of the academic programs. Specifically, students in "Social Work" demonstrated higher levels of creativity compared to their peers in "Tourism," while students in "Marketing" exhibited significantly superior levels of creativity in comparison to those in "Tourism". However, no significant differences in artistic creativity were found between the "Education" and "Marketing"

programs, "Education" and "Theology," "Education" and "Tourism," "Marketing" and "Social Work," or between "Tourism" and "Education" or "Theology."

In the dimension of fluency, students displayed poor performance due to a lack of knowledge on the subject, which affected their ability to generate ideas. This supports the idea that fluency is not necessarily linked to originality. As mentioned in another study, "fluency, by itself, is not an adequate measure of creativity" [18].

Regarding flexibility, students generated diverse ideas, although this contradicts findings that suggest a relationship between fluency and flexibility. Other studies have found that "fluency strongly predicts flexibility" [13]. This raises questions about the relationship between these two dimensions of creativity and suggests that cognitive experience may be an important factor in the generation of creative ideas.

In the "Originality" dimension, most programs received high scores, which aligns with the importance of originality in creativity. Previous research highlights that "originality is one of the three fundamental pillars of creativity" [19]. Furthermore, it has been observed that originality is a prominent indicator compared to other dimensions of creativity in experimental training contexts [20].

In the "Elaboration" dimension, all groups received high scores, suggesting a relationship between cognitive abilities and fluency, flexibility, originality, and elaboration. This supports the idea that "students with high cognitive abilities tend to score higher in terms of fluency, flexibility, originality, and elaboration" [21]. Although there are studies suggesting that elaboration in the creativity of university students is at a moderate level, other precedents suggest that fluency and originality scores are closely related, meaning that a greater number of responses can lead to more novel responses [22].

Finally, it is appropriate to examine the students' scores in the general education course "Art Workshop" in five undergraduate programs offered by a local university, with a focus on assessing their levels of visual artistic creativity. The results revealed significant differences in scores. Specifically, the programs of Marketing, Social Work, Theology, and Education had average scores in the range of 14.6 to 16.5, indicating an expected or anticipated level of achievement. In contrast, the Tourism program obtained an average score of 13.8, which is considered at a lower and developing level according to the evaluation standards of the university system.

The results do not provide a clear explanation for why students in certain majors, such as Tourism, do not reach the levels of achievement observed in comparison to students from other disciplines. This finding raises the need for further research to examine and explore the developmental characteristics related to each factor or dimension of creativity. One hypothesis could suggest that these results are related to certain myths, beliefs, and dogmas that might be limiting the expression of creativity in the case of Theology students. Likewise, it is possible that visual expression styles may not be the most suitable for Tourism students, given the physical demands of their future profession, which require more motor skills and kinesthetic abilities. This underscores the importance of future research in this field.

References

- [1] M. Santaella, "La evaluación de la creatividad," *Sapiens. Rev. Univ. Investig.*, vol. 7, no. 2, pp. 89–106, 2006. URL: <https://www.redalyc.org/articulo.oa?id=41070207>
- [2] B. M. et all Velásquez Burgos, "La creatividad como práctica para el desarrollo del cerebro total," *Tabula Rasa*, no. 13, Colombia, pp. 321–338, 2010. doi: 10.25058/20112742.415.
- [3] Sunedu, "Ley No 30220 | Ley Universitaria | Normas Legales," *El Peruano*, 2014. URL: <https://www.sunedu.gob.pe/wp-content/uploads/2017/04/Ley-universitaria-30220.pdf> (accessed Sep. 11, 2023).
- [4] E. P. Torrance, "Predictive Validity the Torrance Tests of Creative Thinking," *J. Creat. Behav.*, vol. 6, no. 4, 1972, doi: 1002/j.2162-6057.1972.tb00936.x.

- [5] M. E. Zaldívar Carrillo and A. Pérez Fernández, "La fluidez del pensamiento desde la enseñanza de las ciencias," *Rev. Iberoam. Educ.*, vol. 39, no. 5, pp. 1–5, 2006, doi: 10.35362/rie3952558.
- [6] R. Gutiérrez Pérez, "Educación artística y desarrollo creativo," *Arte, individuo y Soc.*, no. 1, pp. 279–288, 2002, doi: 10.5209/ARIS.6723.
- [7] L. J. Nazzari and J. C. Kaufman, "The relationship of the quality of creative problem solving stages to overall creativity in engineering students," *Think. Ski. Creat.*, vol. 38, p. 100734, 2020, doi: 10.1016/j.tsc.2020.100734.
- [8] S. H. Carson, J. B. Peterson, and D. M. Higgins, "Reliability, Validity, and Factor Structure of the Creative Achievement Questionnaire," *Creat. Res. J.*, vol. 17, no. 1, pp. 37–50, Feb. 2005, doi: 10.1207/s15326934crj1701_4.
- [9] B. Sahakian, C. Langley, and V. Leong, "Qué es la 'flexibilidad cognitiva' y por qué es clave para el aprendizaje y la creatividad," *BBC News Mundo*, 2021. URL: <https://www.bbc.com/mundo/noticias-57596474> (accessed Aug. 12, 2023).
- [10] C. Ferrándiz García, M. Ferrando, G. Soto, M. y Sáinz, and M. D. Prieto, "Pensamiento divergente y sus dimensiones.," *An. Psicol.*, vol. 33, no. 1, pp. 40–47, 2017.
- [11] V. K. Kumar and E. R. Holman, "Creativity Styles Questionnaire - Revised," *Creat. Res. J.*, vol. 0419, no. April, pp. 37–41, 2016, doi: 10.1207/s15326934crj1001.
- [12] Y. Wu and W. Koutstaal, "Creative flexibility and creative persistence: Evaluating the effects of instructed vs autonomous choices to shift vs. dwell on divergent and convergent thinking," *Conscious. Cogn.*, vol. 105, no. September, p. 103417, Oct. 2022, doi: 10.1016/j.concog.2022.103417.
- [13] S. Weiss and O. Wilhelm, "Is Flexibility More than Fluency and Originality?," *J. Intell.*, vol. 10, no. 4, 2022, doi: 10.3390/jintelligence10040096.
- [14] J. A. Roche Cárcel, "Las edades de la creatividad. Algunas consideraciones sociológicas sobre la originalidad creativa en la modernidad," *ARBOR Ciencia, Pensam. y Cult.*, vol. 196, no. 797, p. 569, Sep. 2020, doi: 10.3989/arbor.2020.797n3006.
- [15] P. Jenkins, "¿Son lo mismo creatividad y originalidad?," *Brilliantio*, 2022. URL: <https://brilliantio.com/are-creativity-and-originality-the-same/> (accessed Aug. 22, 2023).
- [16] J. J. Morales Artero, "La educación artística y su evaluación: consideraciones generales," *La Evaluación en el Área Educ. Vis. y Plástica en la ESO*, no. 1979, pp. 206–231, 2001. URL: <http://www.tdx.cat/bitstream/handle/10803/5036/jjma09de16.pdf.PDF?sequence=9>
- [17] M. T. Esquivias, "El enigma sobre los referentes del pensamiento creativo y su evaluación," *Rev. Digit. Univ.*, vol. 10, pp. 1–15, 2009. URL: <https://www.revista.unam.mx/vol.10/num12/art88/art88.pdf/> (accessed Sep. 08, 2023)
- [18] M. A. Runco, E. P. Noble, R. Reiter-Palmon, S. Acar, T. Ritchie, and J. M. Yurkovich, "The Genetic Basis of Creativity and Ideational Fluency," *Creat. Res. J.*, vol. 23, no. 4, pp. 376–380, 2011, doi: 10.1080/10400419.2011.621859.
- [19] Á. I. Camposano-Córdova, L. Chachi Montes, M. Salcedo-Nuñez, C. Franco-Carpio, and J. C. Aguilar Bernardillo, "Modelo Imaginación, originalidad y expresión en el desarrollo de la creatividad de los estudiantes universitarios peruanos," *GnosisWisdom*, vol. 2, no. 3, pp. 46–63, 2022, doi: 10.54556/gnosiswisdom.v2i3.45.
- [20] Z. Vally et al., "Examining the effects of creativity training on creative production, creative self-efficacy, and neuro-executive functioning," *Think. Ski. Creat.*, vol. 31, pp. 70–78, Mar. 2019, doi: 10.1016/j.tsc.2018.11.003.
- [21] N. Aris Redó and M. Á. Millán Gutiérrez, "Gifted high school students, research on their creativity," *Hum. Rev. Int. Humanit. Rev. / Rev. Int. Humanidades*, vol. 11, no. Monográfico, pp. 1–10, Dec. 2022, doi: 10.37467/revhuman.v11.4013.
- [22] C. Dippo and B. Kudrowitz, "The Effects of Elaboration in Creativity Tests as it Pertains to Overall Scores and How it Might Prevent a Person From Thinking of Creative Ideas During the Early Stages of Brainstorming and Idea Generation," pp. 1–6, 2015, doi: 10.1115/detc2015-46789.