The Kaufman domains of creativity scale: Validation in a Spanish university context

La escala de los dominios de creatividad de Kaufman: validación en un contexto universitario español

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Abstract:

Creativity is understood to be a set of elements that define a creative person, and the Kaufman Domains of Creativity Scale is internationally regarded as being of scientific value for measuring it. This article verifies the applicability of this instrument in a Spanish university context, after having its 50 elements professionally translated into Spanish and conducting an empirical study that establishes its guarantees of reliability and validity in this scenario. Following analytical exploration of this tool's constituent factors, the original five domains (everyday, performance, academic, mechanical/scientific, and artistic) are restructured into eight (everyday, performance, mechanical/scientific, academic, artistic expression, artistic understanding, emotional, and mathematical). As in other international settings, students were found to give statistical validity to basic social skills, while artistic competences, scientific design strategies, and intellectual capacities are constants within the construct of creativity regardless of the population group being studied. Nonetheless, the distinguishing features are in the artistic domain, which has undergone division, giving prominence to artistic expression and understanding of the arts. Also, in the extraction of an emotional component that goes beyond the everyday, and in a purely mathematical domain disaggregated from the mechanical/scientific domain.

Keywords: creativity domains, reliability, validity, factor analysis, Spanish university students.

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Resumen:

Por creatividad se entiende el conjunto de elementos definitorios de la persona creativa. La escala de dominios de creatividad de Kaufman ha adquirido relevancia científica internacional por su capacidad para medirla. Este trabajo garantiza la aplicabilidad de este instrumento en un contexto universitario español, previa traducción profesional a la lengua española de sus 50 elementos y con la puesta en marcha de un estudio empírico que establece sus garantías de fiabilidad y validez en este escenario. Tras la exploración analítica de los factores constitutivos de la herramienta, los cinco dominios originales (cotidiano, rendimiento, académico, mecánico/científico y artístico) se han reestructurado en ocho (cotidiano, rendimiento, mecánico/científico, académico, expresión artística, comprensión artística, emocional y matemático). En consonancia con otros escenarios internacionales, el alumnado participante ha otorgado robustez a las habilidades sociales básicas. Asimismo, se ha observado que las competencias artísticas, las estrategias de diseño científico y las capacidades intelectuales siguen siendo incuestionables dentro del constructo creatividad, con independencia del grupo poblacional con el que se trabaje. Sin embargo, el matiz diferencial reside en el dominio artístico, que ha sufrido una división que otorga relevancia tanto a la expresión artística como a su comprensión. También en la extracción de un componente emocional más allá del cotidiano y en un dominio exclusivamente matemático desagregado del mecánico/científico.

Palabras clave: dominios de la creatividad, fiabilidad, validez, análisis factorial, alumnado universitario español.

1. Introduction

One of the questions that currently inspires the most disagreement and study in the field of research into creativity is whether it is general or specific (Romo et al., 2017; Gibim & Wechsler, 2020). In other words, whether creativity should be seen as a set of common capacities and characteristics that define it, that creative people possess and that are manifested in all of their activities (Corbalán et al. 2003, Corbalán, 2008); or whether these capacities and characteristics are present in particular domains and areas (Baer, 2011; Kaufman & Baer, 2005; Bermejo & Ruiz, 2017), with an individual's level of creativity varying by domain (Kaufman & Baer, 2004; Ivcevic, 2007; Beghetto & Kaufman, 2007). In addition to the complexity of this debate, "the greatest challenge for understanding the generality of the domain versus the specificity of creativity is understanding the concept of domain in itself" (Sternberg, 2009, p. 25). For their part, Plucker and Beghetto (2004), Stemberg (2009), and Kaufman (2012) suggest combining both visions of creativity. The position adopted in this aspect leads to a particular approach to evaluating creativity and its object, as well as the design of instruments for measuring it (Elisondo & Donolo, 2021).

Proposals for evaluating the domains of creativity have a long history. Carson et al. (2005) used the Creative Achievement Questionnaire (CAQ) to measure nine domains grouped into two factors: arts (drama, writing, humour, music, visual arts, and dance) and sciences (invention, scientific discovery, and culinary), later adding architecture. Ivcevic and Mayer (2009) created a Life-Report Questionnaire (LRQ) to evaluate creativity integrally through specific behaviours, which they arranged into three factors or dimensions: creative lifestyle, performing arts, and intellectual creativity. Other instruments for measuring various domains in everyday creativity are the Creative Behavior Inventory (Hocevar, 1979), the Biographical Inventory of Creative Behaviours (Batey, 2007), the Creative Behaviour Scale (Aranguren & Irrazabal, 2012), the theoretical model of creative behaviour as agentic action (CBAA) (Karwowski & Beghetto, 2019), the Inventory of Creative Activities and Achievements (ICAA) (Diedrich et al., 2018), or the Creative Actions Questionnaire (CAC) and its abbreviated version (CAC42), of Elisondo and Donolo (2016 and 2021). This last one is designed to evaluate creative actions in seven domains: literature, plastic arts and crafts, science and technology, performing arts, music, social participation, and daily creativity.

Research into the domains of creativity and their evaluation has centred the studies by Kaufman and his collaborators. The Creativity Scale for Different Domains (CSDD) (Kaufman & Baer, 2004) was designed to measure nine specific domains: science, interpersonal relations, writing, art, interpersonal communication, solving one's own personal problems, mathematics, crafts, and bodily/physical movement, grouped into three factors: empathy/communication, *practical* creativity, and mathematics/sciences. Kaufman and Baer (2005) also proposed the Amusement Park Theoretical Model (APT), whose theoretical structure underpins their later work, bringing together elements from the general domain that they regard as necessary prerequisites for creativity (intelligence and motivation), and specific elements of the domain, organised by thematic areas. Drawing on the APT, Kaufman et al. (2009) developed the Creative Domain Questionnaire (CDQ), comprising 56 domains and 7 factors: artistic-verbal, artistic-visual, entrepreneurial, interpersonal, mathematics/science, performance, and problem solving.

For Kaufman (2012), the key question is which domains to measure. From the specific domain focus and supported by the studies mentioned above, which used self-report questionnaires, he created the Kaufman Domains of Creativity Scale (K-DOCS). This comprises 50 items for evaluating creativity in 5 domains (self/everyday, scholarly, performance (writing and music), mechanical/scientific, and artistic). At the same time, it confirms correlations between these domains and the big five personality traits (openness to experience, conscientiousness, extraversion, agreeableness, and emotional stability).

The everyday domain consists of the ability to solve different problems and situations that occur in everyday life, and the ability to function in one's surroundings. The scholarly domain comprises aspects such as the ability to collect information, process it, and be able to debate and substantiate it. Meanwhile, the performance domain covers the areas of writing and music. In the case of the mechanical/scientific domain, this encompasses skills relating to designing, understanding, building, and operating mechanisms, scientific experiments, and mathematical aspects, which are also the object of previous studies (Kaufman & Baer, 2004). Finally, the artistic domain covers creative faculties relating to drawing, painting, sculpture, and any artistic technique or activity, and it also incorporates the capacity to analyse, understand, and enjoy works of art and the places relating to art (Kaufman, 2012).

Kaufman (2012), among the limitations of the study and of the K-DOCS instrument, mentions the need to replicate it, validate it, and test the coherence of the factor analysis when applying the scale to other cultures. These aspects are developed in later works. He replicates and validates it with Turkish and Polish informants (McKay et al., 2017), demonstrating the reliability and validity for evaluation of creativity in its five domains.

In addition, Awofala and Fatade (2017) tested the validity of the Domains of Creativity Scale in Nigerian pre-service teachers of science, technology, and mathematics in each of the five original domains.

The K-DOCS scale was also translated into Indonesian and adapted to its context (Susanto et al., 2018), in a work with the participation of 70 students from the Muhammadiyah University. The results showed that 54 of the 24 items of the selected instrument were valid. They concluded that all of the valid items that were reordered could be used to identify creativity or creative potential in students.

Faletič and Avsec (2019) tested the validity of the translation of the instrument into Slovenian with positive results. The confirmatory factor analysis they performed on a sample of 319 people showed an adequate fit for the data from the five-factor model originally proposed.

The psychometric properties and structural validity of the adaptation into German of the K-DOCS (Brauer et al., 2022) have recently been tested. The study was performed with a total of 1379 participants and it supported the five-factor structure of the German K-DOCS, in line with the original version and the linguistic adaptations developed.

Kandemir and Kaufman (2019) translated the Kaufman scale into Turkish and performed a study of the validity and reliability of the test. The results are of great interest for the present

study, as the sample is also of university students and, as shown in the results below, because the factor analysis also displayed modifications in the five starting factors, which became nine as a result of the division of four of them: everyday-interpersonal, everyday-intrapersonal, scholarly, interpretation-literary, interpretation-musical, mechanical/scientific, mathematical, artistic-drawing, and artistic-activity.

The translation into Russian and evaluation of the psychometric properties of the scale is the focus the study by Miroshnik et al. (2022), which obtained satisfactory results and reliability for the context of the study. The exploratory and confirmatory factor analyses they performed with a group of 1011 participants indicated that the model with five correlated factors displayed the best fit with the empirical data. All of the factors displayed good internal consistency and moderate test-retest reliability.

Tu et al. (2018) performed a study with a sample of Chinese students on relations between emotional intelligence and creativity in its dimension as a general domain and as a specific domain. They used Kaufman's scale of domains in the latter case, with the result that emotional intelligence is a predictor of creativity.

On this same line of examining the relations between creativity as a general and a specific domain, Huang et al. (2017) confirmed that creativity in a particular domain, specifically scientific/mathematical creativity, is affected by knowledge of this domain and the capacity for divergent thinking.

Finally, Kapoor et al. (2021) carried out a new evaluation of the factor structure of K-DOCS based on data from a very large sample of participants from the USA, the largest sample to date. They concluded that it is valid as a measure of self-reported creativity, both in the five-domain model (Kaufman, 2012), which is used in the present study, and in the nine-domain model (Kandemir & Kaufman, 2020).

The work that concerns us is on the same line as the research works mentioned above.

2. Methodology

The aim of this study is to validate the Kaufman Domains of Creativity Scale (K-DOCS) (Kaufman, 2012) in a Spanish university context, through an exploratory process of empirical validation.

We have chosen a non-experimental research design with a descriptive quantitative methodology, as our aim is to define the characteristics and dimensions of a specific group, measuring a body of data complied relating to the study in question (Hernández-Sampieri & Mendoza, 2018).

Table 1 shows the dimensions of analysis that will provide information to meet the formulated aim.

TABLE 1. Description of the dimensions of analysis.

Dimensions of analysis	Description
Sociodemographic data	This first dimension consists of the characteristics that describe the informant group. These include sex (male or female), age, specialism (early childhood education or primary education), and year (first year, second year, third year, and fourth year).
Everyday domain	This domain refers to the person's capacity to handle different situations and difficulties that can appear in everyday life. It involves possessing and knowing how to apply a series of emotional skills and tools that help people confront their reality in a healthy way, as well as encouraging others to achieve the same.
Scholarly domain	The scholarly domain involves standing out in academic skills such as researching, gathering information, organising it, writing it or expressing it adequately, among others.
Performance domain	The performance domain involves displaying a high level of creativity in aspects relating to writing, music, and theatre.
Mechanical/Scientific domain	The mechanical/scientific domain is characterised by showing a high level of creativity when generating ideas to create structures, scientific experiments, mathematical problems, and computer programs, and also when implementing them effectively.
Artistic domain	This domain includes all of the skills linked to artistic techniques and enjoyment of them. Creative capacities associated with painting, drawing, crafts, as well as the competence to analyse and enjoy works of art are present.

Note: own elaboration based on Kaufman (2012).

The informant group, which was selected through purposive non-probability sampling, comprised 161 students from the Early Childhood Education (37.9%) and Primary Education (62.1%) degrees. Of them, 73.9% were female, and 26.1%, male, with a mean age of 21 (*SD* = 2.715). 47.8% were in the first year of the degree; 16.8%, in the second year; 17.4%, in the third year; and 18.0%. in the fourth year.

The majority studied at the Faculty of Educational Science of the Universidad de Córdoba (46.6%) and in the Centro de Magisterio Sagrado Corazón (42.9%) affiliated to that university. A very small number of students were from other universities, such as the Universidad de Jaén (3.1%), the Centro Universitario Sagrada Familia in Úbeda (1.9%), the Universidad de Granada (1.2%), the Universidad Autónoma de Madrid (1.2%), the Centro

Universitario La Inmaculada (0.6%), the Universidad de Las Palmas de Gran Canaria (0.6%), the Universidad de Sevilla (0.6%), the Universidad Autónoma de Barcelona (0.6%), and the Universidad de Alcalá de Henares (0.6%). The participants agreed to an informed consent protocol that guaranteed the confidentiality of the data that they provided.

The original English version of the scale displays a very acceptable level of reliability, with Cronbach's alpha values greater than .80 in all domains.

The instrument was translated into Spanish by a professional translator (see Annexe 1). It comprises two parts. The first consists of a set of elements that represent the personal and descriptive data of the sample, prepared ad hoc. The second incorporates 50 elements, evaluated on a 5-point scale, for measuring the level of creativity of the respondents, in this case, students from the degrees in early years education and primary education (from 1 = much less creative to 5 = much more creative), classified in the 5 domains that make up the scale (see Table 2).

TABLE 2. Dimensions and indicators from the K-DOCS scale.

Everyday domain (E)	
E1	1. Finding something fun to do when I have no money.
E2	2. Helping other people cope with a difficult situation.
E3	3. Teaching someone how to do something.
E4	4. Maintaining a good balance between my work and my personal life.
E5	5. Understanding how to make myself happy.
E6	6. Being able to work through my personal problems in a healthy way.
E7	7. Thinking of new ways to help people.
E8	8. Choosing the best solution to a problem.
E9	9. Planning a trip or event with friends that meets everyone's needs.
E10	10. Mediating a dispute or argument between two friends.
E11	11. Getting people to feel relaxed and at ease.
Scholarly domain (S)	
S1	12. Writing a non-fiction article for a newspaper, newsletter, or magazine.
S2	13. Writing a letter to the editor.
S3	14. Researching a topic using many different types of sources that may not be readily apparent.
S4	15. Debating a controversial topic from my own perspective.
S5	16. Responding to an issue in a context-appropriate way.
S6	17. Gathering the best possible assortment of articles or papers to support a specific point of view.
S7	18. Arguing a side in a debate that I do not personally agree with.
S8	19. Analysing the themes in a good book.
S9	20. Figuring out how to integrate critiques and suggestions while revising a work.
S10	21. Being able to offer constructive feedback based on my own reading of a paper.
S11	22. Coming up with a new way to think about an old debate.

Performance domain (P)	
P1	23. Writing a poem.
P2	24. Making up lyrics to a funny song.
P3	25. Making up rhymes.
P4	26. Composing an original song.
P5	27. Learning how to play a musical instrument.
P6	28. Shooting a fun video to air on YouTube.
P7	29. Singing in harmony.
P8	30. Spontaneously creating lyrics to a rap song.
P9	31. Playing music in public.
P10	32. Acting in a play.
Mechanical/Scientific domain (MS)	
MS1	33. Carving something out of wood or similar material.
MS2	34. Figuring out how to fix a frozen or buggy computer.
MS3	35. Writing a computer program.
MS4	36. Solving math puzzles.
MS5	37. Taking apart machines and figuring out how they work.
MS6	38. Building something mechanical (like a robot).
MS7	39. Helping to carry out or design a scientific experiment.
MS8	40. Solving an algebraic or geometric proof.
MS9	41. Constructing something out of metal, stone, or similar material.
Artistic domain (A)	
A1	42. Drawing a picture of something I've never actually seen (like an alien).
A2	43. Sketching a person or object.
A3	44. Doodling/Drawing random or geometric designs.
A4	45. Making a scrapbook page out of my photographs.
A5	46. Taking a well-composed photograph using an interesting angle or approach.
A6	47. Making a sculpture or a piece of pottery.
A7	48. Appreciating a beautiful painting.
A8	49. Coming up with my own interpretation of a classic work of art.
A9	50. Enjoying an art museum.

Note: own elaboration based on the translation of Kaufman's K-DOCS scale (2012).

To make sense of the data collected, they were organised, described, and analytically interpreted using version 25 of the Statistical Package for the Social Sciences software program. Statistical validation of the instrument was done by analysing its internal consistency, analysing the capacity for discrimination of the elements, and performing exploratory factor analysis. In addition, after establishing the underlying structure of the construct, this was validated using a structural equations analysis process in the AMOS v. 23.

3. Results

The internal consistency analysis using Cronbach's alpha gave a total value of .959. This result indicates a high correlation and solidity in the responses given, suggesting that the questionnaire is an instrument with high reliability. Similarly, having observed the consistency values of each of the domains shown in Table 3, we can affirm that they are high and that, consequently, each domain has signs of reliability.

TABLE 3. Total values and values by domain for Cronbach's alpha for the K-DOCS scale.

Domain	Cronbach's alpha
Everyday	.926
Scholarly	.919
Performance	.922
Mechanical/Scientific	.908
Artistic	.882
Total	.959

Subsequently, the data from examining the partial values associated with each of the evaluation elements show that, if these elements are removed from the instrument, all of them are consistent and valid units of measurement (alpha values of .959 or less).

Furthermore, the power of discrimination of the elements that make up this tool was estimated in order to measure their capacity to distinguish between the participants with a high level in the range measured and those who have a low level (García et al., 2000). To test this characteristic, the 50 elements of the scale were selected and the total sum was recoded into three groups (low, medium, and high):

1. Low group (lowest value, 33rd percentile): (50, 149).
2. Medium group (33rd percentile, 66th percentile): (150, 170).
3. High group (66th percentile, highest value): (171, 250).

To establish whether there was a statistical difference between the groups that gave a high score and the groups that gave a low score in the chosen elements, we performed the independent samples *t* test (significance level = .05). The results show that 100% of these elements have an admissible level of statistical discrimination, given that the *p* values corresponding to their items were less than .05. As a consequence, these findings indicates that the questionnaire has adequate value for its use.

Subsequently, we have attempted to test the underlying theoretical structure of Kaufman's original instrument (2012) through linear causal relations between the constituent elements of the instrument when it is applied in a Spanish university context. To do so, we used confirmatory factor analysis. The data in Table 4 indicate that the factorial model obtained does not fit the original model.

TABLE 4. Fit measures obtained from the confirmatory factor analysis.

Absolute fit measures		Incremental fit measures			Parsimonious fit measures			
χ^2 *(p)*	RMSEA	CFI	TLI	NFI	PRATIO	PCFI	PNFI	AIC
.000	0.106	0.672	0.657	0.572	.955	.642	.547	3602.356

Note: Criteria stipulated: χ^2 *(p)* >.05; RMSEA >.05; CFI >.90; TLI >.90; NFI >.90; PRATIO, PCFI, and PNFI between 0 and 1; low AIC.

It is for this reason that we have chosen to test the dimensional structure of the instrument in this new instructional context, something that has involved studying the internal structure of the instrument using exploratory factor analysis. After selecting the extraction (principal components) and rotation (varimax) methods and testing the appropriateness of their application (KMO = .861; MSA >.767; Barlett, χ^2 = 6855.416, p = .000), a total of 8 factors were obtained that explain 68.513% of the criterion variance (see Table 5).

TABLE 5. Rotated component matrix.

Evaluation elements	Factors							
	1	2	3	4	5	6	7	8
2. Helping other people cope with a difficult situation (E2).	.809							
7. Thinking of new ways to help people (E7).	.763							
10. Mediating a dispute or argument between two friends (E10).	.752							
11. Getting people to feel relaxed and at ease (E11).	.749							
3. Teaching someone how to do something (E3).	.699							
9. Planning a trip or event with friends that meets everyone's needs (E9).	.687							
8. Choosing the best solution to a problem (E8).	.645							
1. Finding something fun to do when I have no money (E1).	.636							

16. Responding to an issue in a context-appropriate way (S5).	.625		
18. Arguing a side in a debate that I do not personally agree with (S7).	.504		
22. Coming up with a new way to think about an old debate (S11).	.503		
26. Composing an original song (P4).		.792	
30. Spontaneously creating lyrics to a rap song (P8).		.761	
24. Making up lyrics to a funny song (P2).		.751	
31. Playing music in public (P9).		.738	
25. Making up rhymes (P3).		.732	
29. Singing in harmony (P7).		.711	
27. Learning how to play a musical instrument (P5).		.709	
23. Writing a poem (P1).		.684	
28. Shooting a fun video to air on YouTube (P6).		.663	
32. Acting in a play (P10).		.519	
37. Taking apart machines and figuring out how they work (MS5).			.799
35. Writing a computer program (MS3).			.766
38. Building something mechanical (like a robot) (MS6).			.751
33. Carving something out of wood or similar material (MS1).			.706
34. Figuring out how to fix a frozen or buggy computer (MS2).			.691

41. Constructing something out of metal, stone, or similar material (MS9).	.665		
47. Making a sculpture or a piece of pottery (A6).	.535		
19. Analysing the themes in a good book (S8).		.710	
20. Figuring out how to integrate critiques and suggestions while revising a work (S9).		.673	
14. Researching a topic using many different types of sources that may not be readily apparent (S3).		.666	
15. Debating a controversial topic from my own perspective (S4).		.656	
13. Writing a letter to the editor (S2).		.600	
17. Gathering the best possible assortment of articles or papers to support a specific point of view (S6).		.593	
21. Being able to offer constructive feedback based on my own reading of a paper (S10).		.524	
12. Writing a non-fiction article for a newspaper, newsletter, or magazine (S1).		.499	
43. Sketching a person or object (A2).			.830
42. Drawing a picture of something I've never actually seen (like an alien) (A1).			.752
44. Doodling/drawing random or geometric designs (A3).			.738

45. Making a scrapbook page out of my photographs (A4).				.515				
49. Coming up with my own interpretation of a classic work of art (A8).					.763			
50. Enjoying an art museum (A9).					.752			
48. Appreciating a beautiful painting (A7).					.728			
5. Understanding how to make myself happy (E5).						.772		
4. Maintaining a good balance between my work and my personal life (E4).						.756		
6. Being able to work through my personal problems in a healthy way (E6).						.648		
40. Solving an algebraic or geometric proof (MS8).							.773	
36. Solving math puzzles (MS4).							.733	
39. Helping to carry out or design a scientific experiment (MS7).							.640	
Percentage of variance explained	14.068	12.526	9.692	9.630	6.932	5.847	5.254	4.563

These factors guarantee the structural quality of the original tool, although there are distinguishing elements to consider in the context of Spain:

- Factor 1: everyday domain. This first factor, which explains 14.068% of the criterion variance, is a set of basic social abilities relating to the possession of skills for solving and dealing with conflicts or difficult situations and maintaining adequate social skills in the everyday setting. Everything relating to the management of emotions is excluded from the original domain established by Kaufman while aspects

of the scholarly domain relating to reflection and contextualised reasoning are included.

- Factor 2: performance domain. This factor, which contributes 15.526% of the criterion variance, maintains an identical form to the original version of the performance domain and it includes everything relating to skills for music, theatre, drawing, painting, and writing.

- Factor 3: mechanical/scientific domain. This factor, which has the same name as the original one, explains 9.692% of the criterion variance, and expresses creative skills relating to the mechanical and scientific world, specifically constructing, repairing, and creating mechanisms, designing computer programs, etc. However, the three elements that refer to mathematics skills are excluded from it and comprise a new domain, while it includes one element from the Artistic domain relating to modelling and one element from the Scholarly domain relating to thematic analysis.

- Factor 4: academic domain. This factor, with a specific weight of 9.630% of the criterion variance, refers to Kaufman's domain of the same name. It comprises a series of intellectual capacities, among which stand out well-founded enquiry and internalisation of information, the critical analysis competence, handling a range of information sources, and the capacity for expression adapted to various contexts.

- Factor 5: artistic expression domain. The elements in this factor, which contribute 6.932% of the criterion variance, are part of the set of elements of Kaufman's Artistic domain. Nonetheless, in this study, four of them have been grouped into another different factor, and so this component is described as the person's skill for drawing, mapping out drafts and images and being capable of putting them down on paper, canvas, or another material with various artistic techniques and in an original way.

- Factor 6: artistic comprehension domain. This factor, which contributes 5.847% of the criterion variance, is described as people's ability to enjoy art and possession of sufficient knowledge to understand it and connect their emotions to it.

- Factor 7: emotional domain. This factor is original to this work and explains 5.254% of the criterion variance. It consists of elements that were previously part of the everyday domain and refer to the ability to develop adequate emotional intelligence, comprising one's own emotions as well as those of other people.

- Factor 8: mathematical domain. The last factor, which contributes 4.563% of the criterion variance, does not appear in this form in the structure of the K-DOCS scale, but rather is derived from the elements of the mechanical/scientific domain. It comprises the competences relating to the mathematical

field such as solving mathematical problems and puzzles, as well as generating ideas aimed at creating scientific tests and experiments.

4. Discussion and conclusions

According to this work, the Spanish version of the Kaufman Domains of Creativity Scale (K-DOCS) can be used with guarantees of reliability. We felt it was necessary to show the reliability and validity of the questionnaire in the Spanish context. The data obtained demonstrated its suitability for use in the setting of this research, which is in line with studies carried out in other cultural contexts (McKay et al., 2017; Awofala & Fatade, 2017; Susanto et al., 2018; Faletič & Avsec, 2019; Brauer et al., 2022; Kadamir & Kaufman, 2019; Miroshnik et al., 2022).

When empirically exploring the constituent factors of the tool, the five K-DOCS domains (Kaufman, 2012): everyday, performance, scholarly, mechanical/scientific, and artistic, gave rise to eight factors, which we gave the following names: everyday, performance, mechanical/scientific, scholarly, artistic expression, artistic comprehension, emotional, and mathematical.

As can be seen, the first four factors are the same as in the original scale, and so we can deduce that there is still no question about relevance of basic social skills, artistic competences, scientific design strategies, and intellectual capacities within the construct of creativity independently of the population group with which one works.

In contrast, the grouping of the item in the artistic domain established by Kaufman (2012) is split into two different factors in this study: artistic expression and artistic comprehension. This is because people might enjoy and understand artistic works but lack the skills to express themselves artistically (for example, drawing), and vice versa (Gardner, 1994). There is a striking coincidence here with the results of the study with Turkish university students by Kadamir and Kaufman (2019), in which they conclude that there are nine factors, including the division of the artistic domain into artistic and aesthetic skill, and the scientific domain into science and mathematics.

Moreover, the appearance of two new domains (emotional and mathematical) was noted. The emotional factor includes some elements of Kaufman's everyday domain (2012). However, implementing the tool in the context of Spanish universities produces a domain centred expressly on emotional intelligence, in line with Tu et al. (2018), who identified significant links between emotional intelligence and creativity when using self-evaluation questionnaires. They noted that emotional intelligence did not show any relationship with divergent thinking, but it did positively predict the five domains of creativity. According to Xu et al. (2019), both constructs maintain a moderate correlation. Works such as those by Delgado et al. (2019) or Sánchez (2023) reveal the importance of working on students emotional competence as a way of improving their formative, social, and professional profile.

Something similar happens with regards to the new mathematical domain. This last factor consists of some of the elements from the original mechanical/scientific domain. However, in this work, we have evaluated regrouping certain elements into a more specific domain focusing solely on the field of mathematics, as Kadamir and Kaufman (2019) established. On this same line of examining the relations between creativity as a general and a specific domain, Huang et al. (2017) confirmed that creativity in a particular domain, specifically scientific/mathematical creativity, is affected by knowledge of this domain and the capacity for divergent thinking. The existence of a mathematics/science domain that is consistently distinct from other domains of creativity is supported by an integral meta-analysis of empirical studies that examine the domains of creativity (Julmi & Scherm, 2016). The meta-analysis indicates that stable patterns are apparent in all of the studies, which generally correspond with the practical, empathy/communication, and mathematics/science creativity factors that Kaufman and Baer (2004) identify.

It is notable that the data obtained here are limited to university students from the field of education, most of whom are from two specific centres of a Spanish university, and so future studies should include students from other universities in Spain and from different areas of knowledge to establish a comprehensive fit of the tool to the whole of the university population.

Annex

Kaufman Domains of Creativity Scale (K-DOCS)

Instructions: compared to people of approximately your age and life experience, how creative would you rate yourself for each of the following acts? For acts that you have not specifically done, estimate your creative potential based on your performance on similar tasks. Please note the following rating scale: 1 = much less creative, 2 = less creative, 3 = neither more or less creative, 4 = more creative, 5 = much more creative.

1. Finding something fun to do when I have no money.	1	2	3	4	5
2. Helping other people cope with a difficult situation.	1	2	3	4	5
3. Teaching someone how to do something.	1	2	3	4	5
4. Maintaining a good balance between my work and my personal life.	1	2	3	4	5
5. Understanding how to make myself happy.	1	2	3	4	5
6. Being able to work through my personal problems in a healthy way.	1	2	3	4	5

7. Thinking of new ways to help people.	1	2	3	4	5
8. Choosing the best solution to a problem.	1	2	3	4	5
9. Planning a trip or event with friends that meets everyone's needs.	1	2	3	4	5
10. Mediating a dispute or argument between two friends.	1	2	3	4	5
11. Getting people to feel relaxed and at ease.	1	2	3	4	5
12. Writing a non-fiction article for a newspaper, newsletter, or magazine.	1	2	3	4	5
13. Writing a letter to the editor.	1	2	3	4	5
14. Researching a topic using many different types of sources that may not be readily apparent.	1	2	3	4	5
15. Debating a controversial topic from my own perspective.	1	2	3	4	5
16. Responding to an issue in a context-appropriate way.	1	2	3	4	5
17. Gathering the best possible assortment of articles or papers to support a specific point of view.	1	2	3	4	5
18. Arguing a side in a debate that I do not personally agree with.	1	2	3	4	5
19. Analysing the themes in a good book.	1	2	3	4	5
20. Figuring out how to integrate critiques and suggestions while revising a work.	1	2	3	4	5
21. Being able to offer constructive feedback based on my own reading of a paper.	1	2	3	4	5
22. Coming up with a new way to think about an old debate.	1	2	3	4	5
23. Writing a poem.	1	2	3	4	5
24. Making up lyrics to a funny song.	1	2	3	4	5
25. Making up rhymes.	1	2	3	4	5
26. Composing an original song.	1	2	3	4	5
27. Learning how to play a musical instrument.	1	2	3	4	5
28. Shooting a fun video to air on YouTube.	1	2	3	4	5
29. Singing in harmony.	1	2	3	4	5
30. Spontaneously creating lyrics to a rap song.	1	2	3	4	5

31. Playing music in public.	1	2	3	4	5
32. Acting in a play.	1	2	3	4	5
33. Carving something out of wood or similar material.	1	2	3	4	5
34. Figuring out how to fix a frozen or buggy computer.	1	2	3	4	5
35. Writing a computer program.	1	2	3	4	5
36. Solving math puzzles.	1	2	3	4	5
37. Taking apart machines and figuring out how they work.	1	2	3	4	5
38. Building something mechanical (like a robot).	1	2	3	4	5
39. Helping to carry out or design a scientific experiment.	1	2	3	4	5
40. Solving an algebraic or geometric proof.	1	2	3	4	5
41. Constructing something out of metal, stone, or similar material.	1	2	3	4	5
42. Drawing a picture of something I've never actually seen (like an alien).	1	2	3	4	5
43. Sketching a person or object.	1	2	3	4	5
44. Doodling/Drawing random or geometric designs.	1	2	3	4	5
45. Making a scrapbook page out of my photographs.	1	2	3	4	5
46. Taking a well-composed photograph using an interesting angle or approach.	1	2	3	4	5
47. Making a sculpture or a piece of pottery.	1	2	3	4	5
48. Appreciating a beautiful painting.	1	2	3	4	5
49. Coming up with my own interpretation of a classic work of art.	1	2	3	4	5
50. Enjoying an art museum.	1	2	3	4	5

Observations and suggestions:

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